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ELECTRIC RAILWAY JOURNAL

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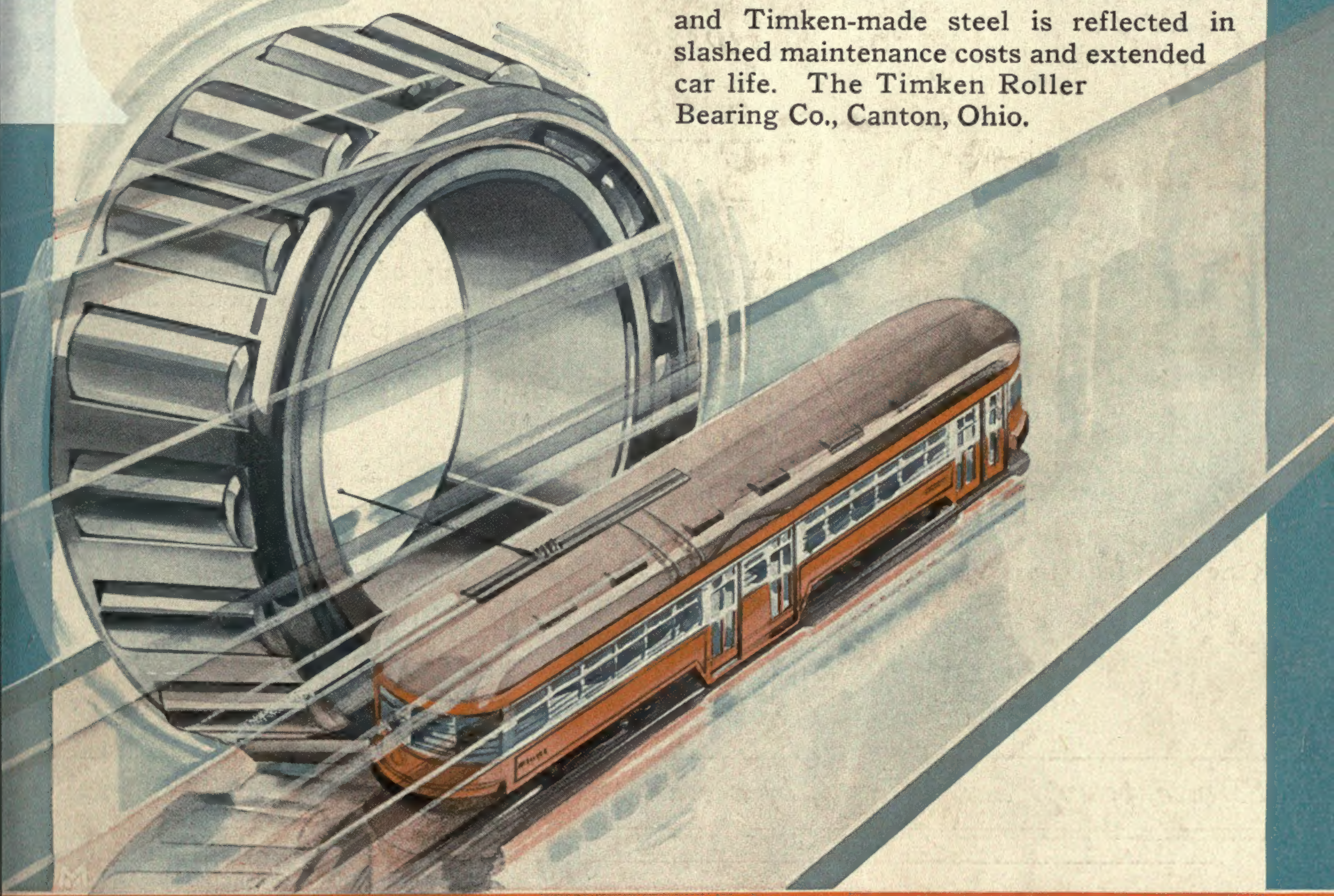
Comfort Comes With Smoothness

—and good-will comes with comfort. Timken Bearing Equipped electric cars seem to *glide* rather than roll, so gentle—so joltless is their motion.

Friction elimination also means faster schedules, reduced power demands and saving of lubricant, while the mastery of radial-thrust loads by the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel is reflected in slashed maintenance costs and extended car life. The Timken Roller Bearing Co., Canton, Ohio.



TIMKEN *Tapered Roller* **BEARINGS**

CLEVELAND

improves its superior service

with

100 NEW CARS

ALL Cleveland is proud of the marked efficiency and attractiveness of its street car service, and of the courtesy of its personnel.

A super service at the lowest actual cost to the riders is the aim of the management of the Cleveland Railway Company.

One hundred new cars, each equipped with Westinghouse HL control and quadruple 50-hp. motors, have recently been added to the Cleveland Railway Company's 1500 modern street cars.

Westinghouse is proud to have furnished the major portion of the electrical equipment for the Cleveland Railway.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31256

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY AT 10:00 P. M., E. S. T.

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

MORRIS BUCK
Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY

JOHN A. MILLER, JR., *Managing Editor*

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PAUL WOOTON
Washington
ALEX MCCALLUM
London, England

LOUIS F. STOLL
Publishing Director

Coming Soon!

JUNE 14
TO BE EXACT

The Annual Convention Number

Analyzing all phases of equipment development and showing how advanced design has improved transportation standards.

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Tenth Avenue at 36th Street
New York, N. Y.

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1930

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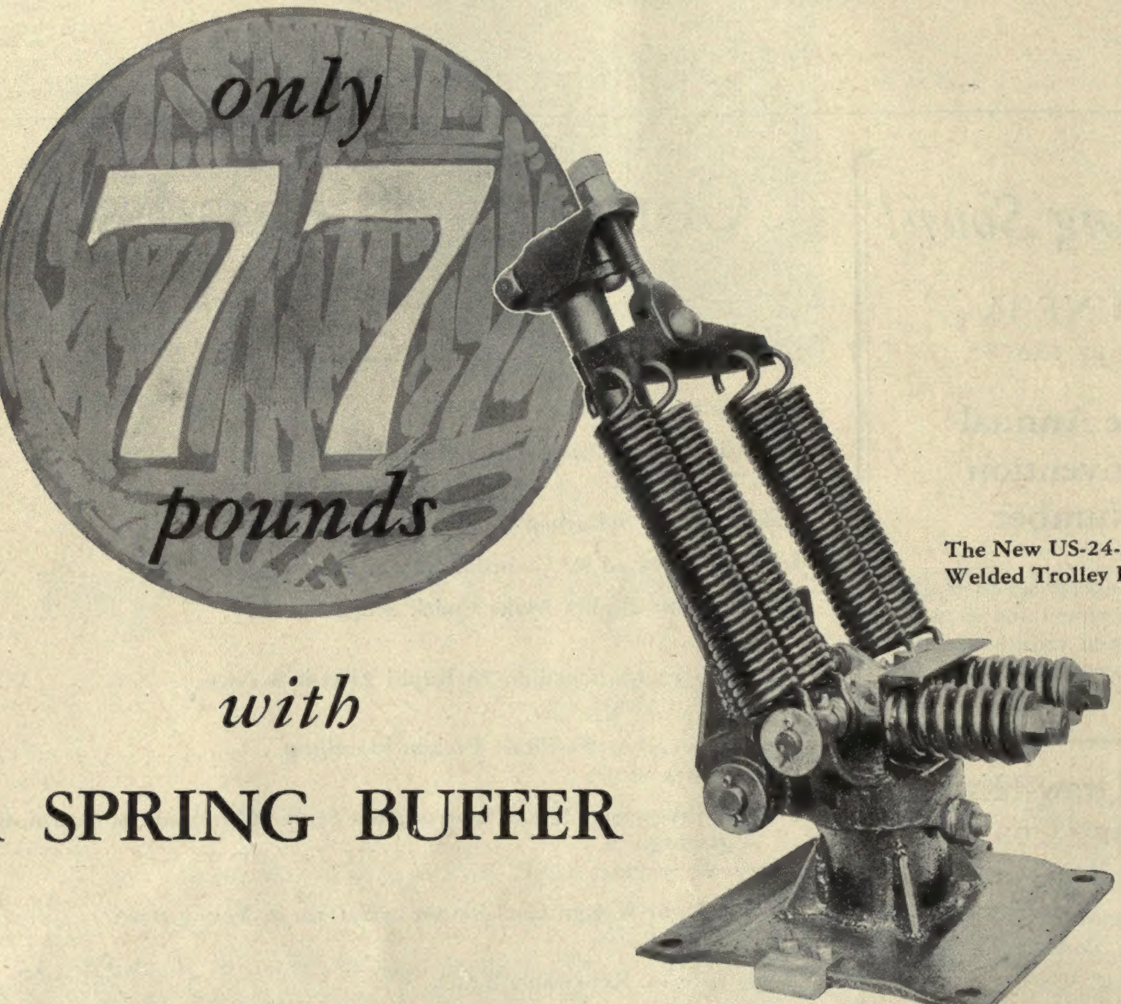


The New US-24-A All-steel Welded Trolley Base

with A SPRING BUFFER

INCLUDING a spring buffer which effectively cushions and dampens the action of a rebounding trolley pole, the new US-24-A trolley base weighs only 77 pounds.

To embody this highly desirable feature and at the same time to hold down the weight, have meant no sacrifice whatever in strength. In fact, the all-steel construction with welded joints provides even greater strength than has been available heretofore in this item of car equipment.

The light-weight reciprocating parts of this base have quickened trolley pole action and permitted lower wheel pressures than were previously possible. Thus, there is less possibility of dewirements at ears, frogs, or other hard spots and quieter operation also is obtained. Wear and tear on overhead and equipment are likewise reduced.

With these direct benefits of light weight, the US-24-A trolley base also has the advantages of a simplified and sturdy construction, ease of inspection, and negligible upkeep.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

---

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1930

Westinghouse

W WESTINGHOUSE ELECTRIC

T 31257

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY AT 10:00 P. M., E. S. T.

COMPENSATING FINGERS

. . . your Right-hand digits in maintenance work

COMPENSATING fingers are self-aligning. Regardless of the contour of the controller drum surface, Westinghouse compensating fingers automatically adjust themselves to the position of maximum contact.

These fingers are not only available for type K controllers, but also for various other types of main circuit commutating switches. In addition, we recently have developed a compensating interlock finger which has proved a big success in the elimination of finger breakage. It is suitable for master controllers, unit switches, interlocks, etc.

A new type reverser finger is now available which will help to relieve overloaded reversers.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

---

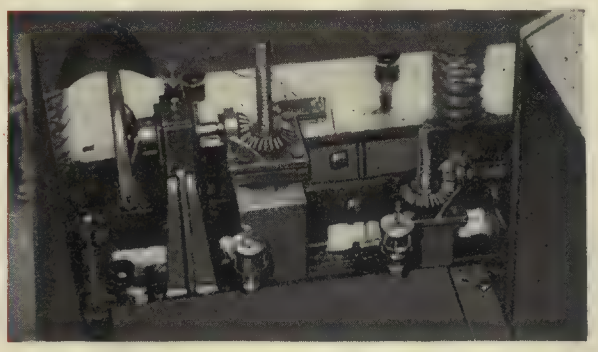
Westinghouse

T 30722-A

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY AT 10:00 P. M., E. S. T.

Dragging out corrugations

Reciprocating Grinder Car, showing one of the grinding units.



Interior view of a Reciprocating Grinder Unit installed in car.

Interior view of Reciprocating Grinder Car.

or dragging out the job?

YOU can drag out the process of removing corrugations but you can't drag out the corrugations—you have to grind them out. In other words, rigging up an old car to drag abrasive blocks over the track reduces corrugation but it does NOT and can NOT remove them altogether without costing altogether too much if you really figure the actual cost.

Corrugations, like malignant physical growths, have to be eradicated completely, otherwise the remedial effort is just so much lost motion.

Drag cars help but cannot cure. For complete cure, you need a reciprocating grinder action.

For bad cases, the surest cure yet discovered is to equip a car with Reciprocating Grinder units such as we have supplied to a number of important lines.

On a basis of actual cost per mile of corrugations actually eradicated, we can show you extremely worth-while economies over any other method yet devised.

Details of the equipment we offer for installation in any car supplied by you and reports of results achieved by roads using this equipment are available. An opportunity to lay the facts before you will be welcomed.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS

Chester F. Gailor, 50 Church St., New York
Chas. N. Wood Co., Boston
H. F. McDermott, 208 S. LaSalle St., Chicago
F. F. Bodler, San Francisco, Cal.
H. E. Burns Co., Pittsburgh, Pa.
Equipment & Engineering Co., London

8513

CHICAGO Overhead Trolley

View of new trolley bus for Chicago. Equipment includes O-B Dash-Illuminating Headlights, O-B Featherweight Trolley Bases, O-B Trolley Retrievers, O-B Trolley Poles and the new O-B Swivel Harp and Wheel especially designed for trolley bus service.

The new Chicago trolley bus under the special overhead construction at Naragansett Avenue, the western end of the Diversey Avenue line.

ON April 17 the first of the new trolley buses started operation in Chicago. This new extension of service by the Chicago Surface Lines, which has been under consideration for years, is by far the most comprehensive trolley bus installation to date. The decision of the engineers of the Chicago Surface Lines to institute this method of transportation will undoubtedly exercise as an important influence in the future extension and development of trolley bus service.

The installation at Chicago, when completed, will cover seventeen route miles in the West and North-west section of the city, and will require an investment of approximately $1,000,000. The first service to be installed is on Diversey Avenue, to be followed in a few days with service on Central Avenue. Photographs of the first trolley bus to operate over this new system shown above.

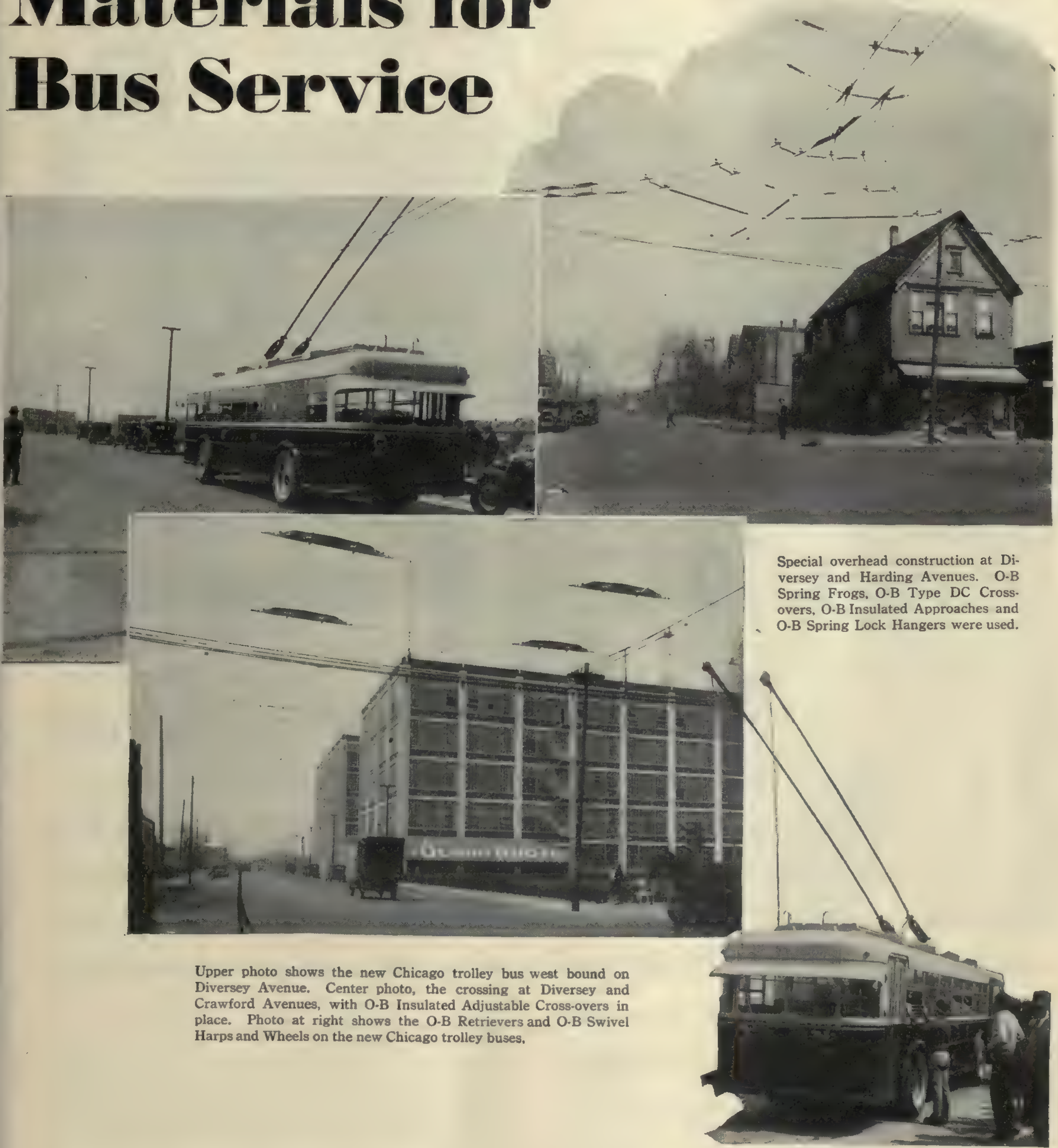
Forty-one trolley buses have been ordered to take care of initial requirements. The buses have a seating capacity of 40 and represent the most modern design.

Entirely in keeping with this advanced design, engineers of the Chicago Surface Lines selected, as standard equipment on all trolley buses, the O-B Dash-Illuminating Headlight, the O-B Featherweight (Form 5) 6-spring Trolley Base, O-B Trolley Retrievers, O-B Trolley Poles, and the new O-B Swivel Harp and Wheel which has been specially designed for trolley bus service.

And, because of the excellent record of standard O-B line materials, they are found represented on this installation. These materials include O-B Spring Lock Hangers, O-B Type M Curve Hangers, O-B Insulated Approaches, O-B Type DC Cross-overs, O-B Insulated Adjustable Cross-overs and O-B Spring Frogs.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1238 CL

Picks O-B Equipment and Materials for Bus Service



Special overhead construction at Diversey and Harding Avenues. O-B Spring Frogs, O-B Type DC Crossovers, O-B Insulated Approaches and O-B Spring Lock Hangers were used.

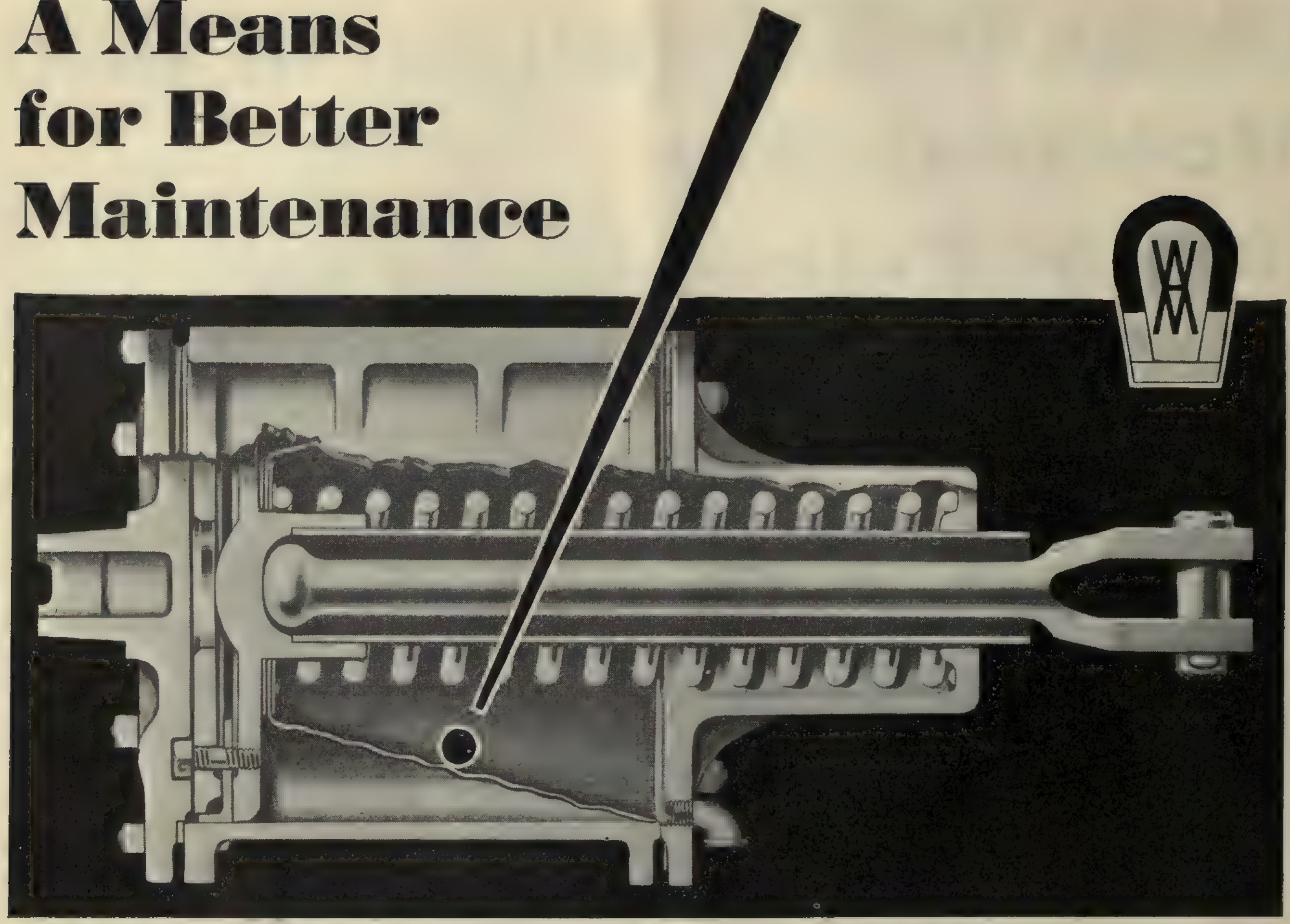
Upper photo shows the new Chicago trolley bus west bound on Diversey Avenue. Center photo, the crossing at Diversey and Crawford Avenues, with O-B Insulated Adjustable Cross-overs in place. Photo at right shows the O-B Retrievers and O-B Swivel Harps and Wheels on the new Chicago trolley buses.

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

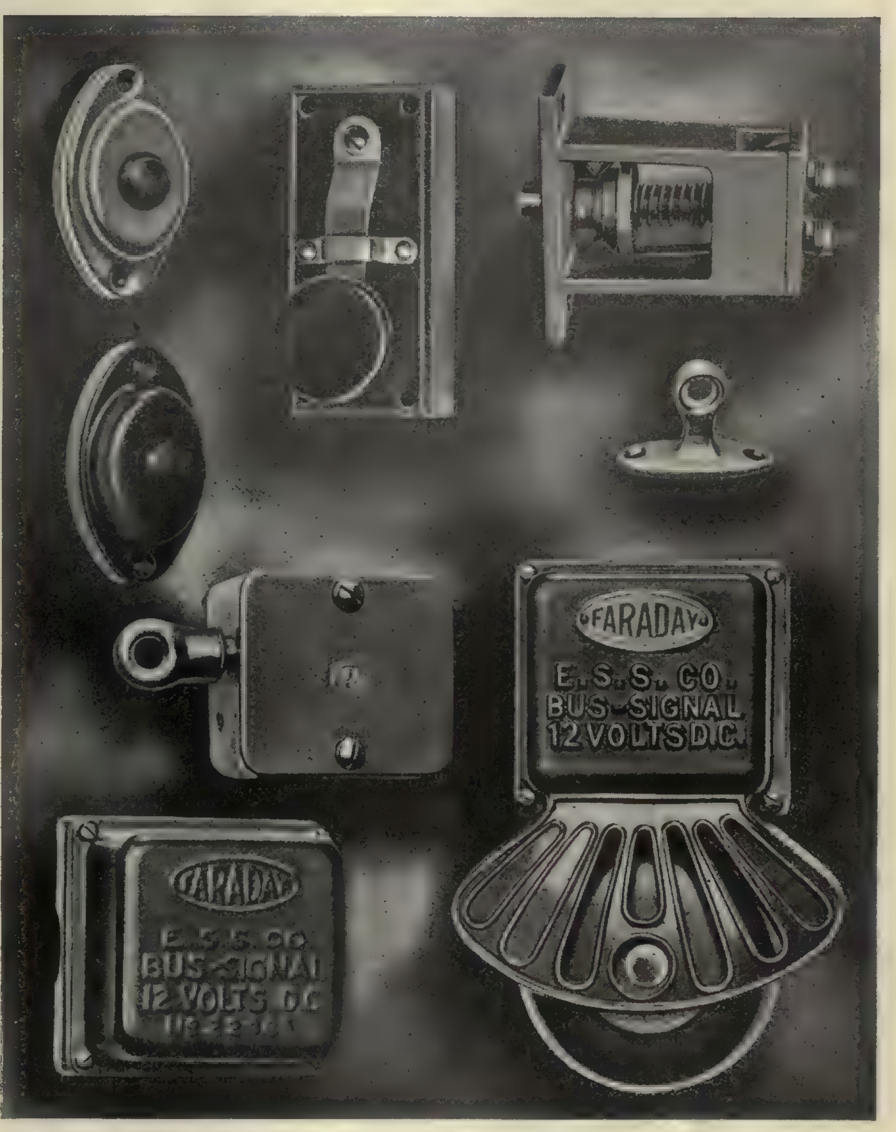
A Means for Better Maintenance



A collapsible water-proof hood inserted in the brake cylinder as shown, is an effective means of preventing dirt and moisture that may sift in through the non-pressure head from reaching the cylinder walls . . . Keeping cylinders clean in this manner will reduce leakage, lengthen life of packing cups, and decrease maintenance expense. Many railroads are now realizing the benefits of this protector.

WESTINGHOUSE
Traction Brake Co.
General Office and Works
Wilmerding, Pa.

FARADAY SIGNAL SYSTEMS



Faraday Signal Systems are supplied in high and low voltage types for cars and buses. The Faraday line consists of bells, buzzers, pull switches, door switches, pushes, cord guides and other allied material.

"UP IN THE AIR" MOTORMEN

Without Faraday Passenger Signal Systems your motormen are "up in the air" trying to fulfill the wishes of your passengers. Dissatisfied patrons, unnecessary stops, unnecessary maintenance expense, slower schedules and the dangerous practice of having your motormen's attention constantly distracted from his more important functions are very often the outcome of trying to get along without a reliable passenger signal system.

At one shot Faraday Signal Systems eliminate these difficulties by providing an easy, unfailing system for signalling the motorman. The bells, buzzers, pushes, etc., which make up the systems are all highly engineered in order to eliminate failures and maintenance costs. Always specify Faraday.

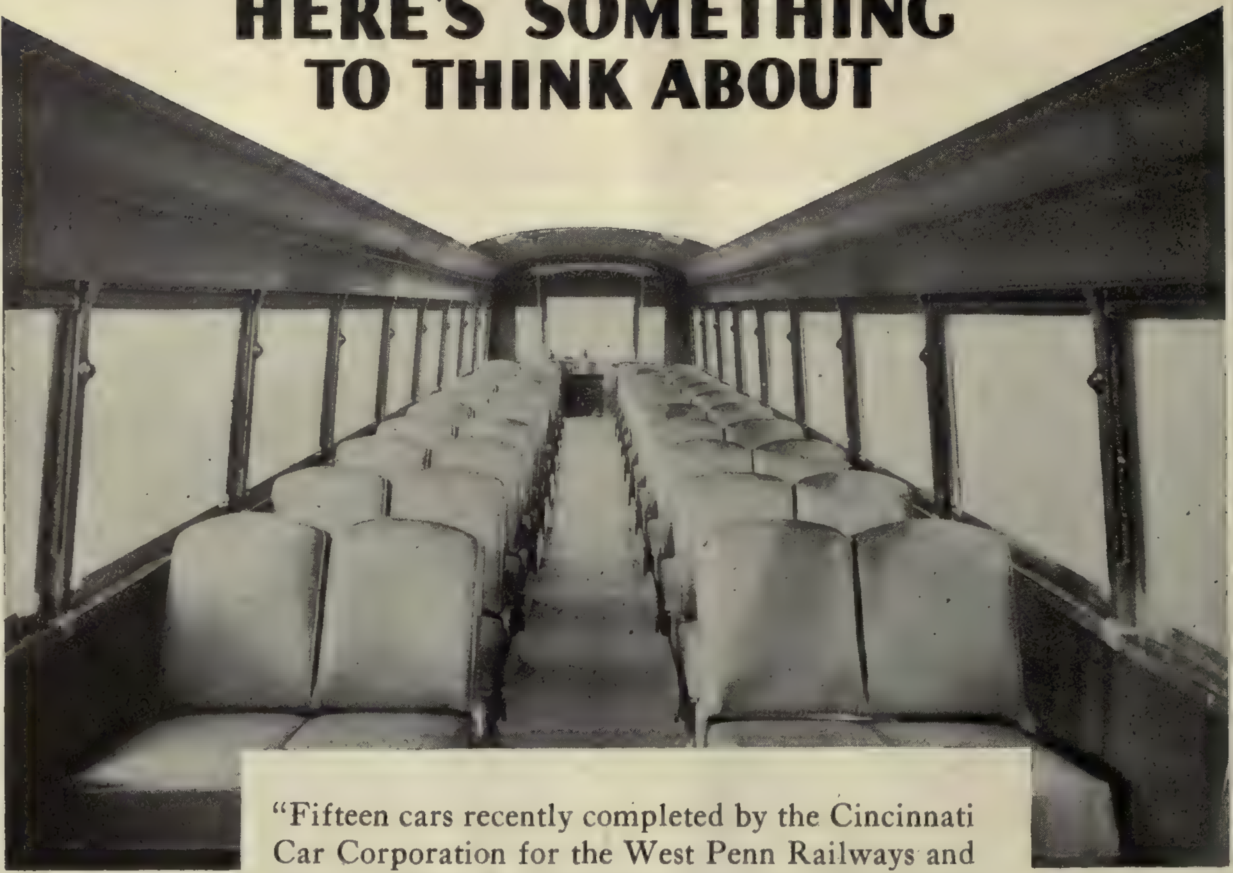
Faraday Passenger Signal Systems are made for both cars and buses and are listed in our catalogs Nos. 7 and 9. They are but one of the numerous specialties for cars and buses which make up the well known Keystone line of equipment for the Transportation Industry.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Main and District Offices:
17th and Cambria Streets, Philadelphia, Pa.; 111 North Canal Street, Chicago, Ill.; 50 Church Street, New York City.

Branches — Pittsburgh, Boston, Detroit, Scranton, Canadian Agents—Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver



HERE'S SOMETHING TO THINK ABOUT

"Fifteen cars recently completed by the Cincinnati Car Corporation for the West Penn Railways and Monongahela West Penn Railways were equipped with HALE & KILBURN No. 392-A Walkover Seats."

Behind this simple announcement of the sale of some 360 HALE & KILBURN seats, is something to think about.

All of those seats are deeply upholstered. The seat cushions are 7 inches deep, well sprung, nicely padded. The backs are deeply upholstered, with a springy softness that is unusually comfortable. The West Penn Railways insisted upon this superior comfort to insure that passengers would recognize it and ride more frequently on their roads.

When leading traction companies are taking special pains to make passengers UNUSUALLY comfortable, it is something to think about.

HALE & KILBURN SEATS

HALE & KILBURN CO.

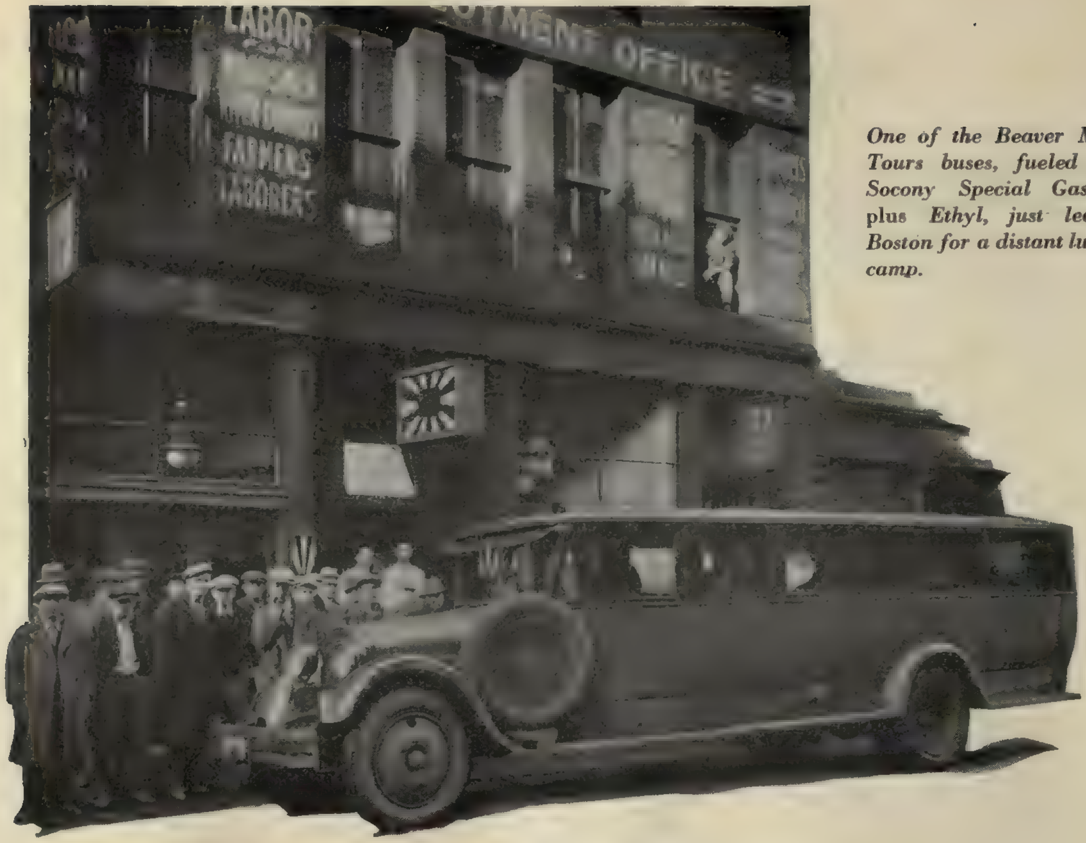
General Offices and Works: 1800 Lehigh Ave., Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York.
Hale & Kilburn Co., McCormick Bldg., Chicago.
E. A. Thornwell, Candler Bldg., Atlanta.
Frank F. Bodler, 903 Monadnock Bldg., San Francisco.
W. L. Jefferies, Jr., Mutual Bldg., Richmond.
W. D. Jenkins, Praetorian Bldg., Dallas, Texas.
H. M. Euler, 146 N. Sixth St., Portland, Oregon.

Both passengers and the operator enjoy a mutual feeling of safety when protected by the National Pneumatic Signal Light System. This system automatically notifies the operator the instant that all doors are closed and the car can safely proceed.

NP NATIONAL PNEUMATIC CO.



One of the Beaver Motor Tours buses, fueled with Socony Special Gasoline plus Ethyl, just leaving Boston for a distant lumber camp.

Into the lumber woods ...up mountain trails with

Socony Special Gasoline *plus* Ethyl

THE thirteen buses of the Beaver Motor Tours of Boston specialize in the transportation of labor to lumber camps, to railroad concentrations and to road construction jobs in New York and New England. There are steep, rough roads to travel, sometimes even trails to be broken in the yearly mileage of over 700,000 miles.

Socony Special plus Ethyl has proved equal to the job, starting easily in cold weather and climbing mountain grades with power to spare.

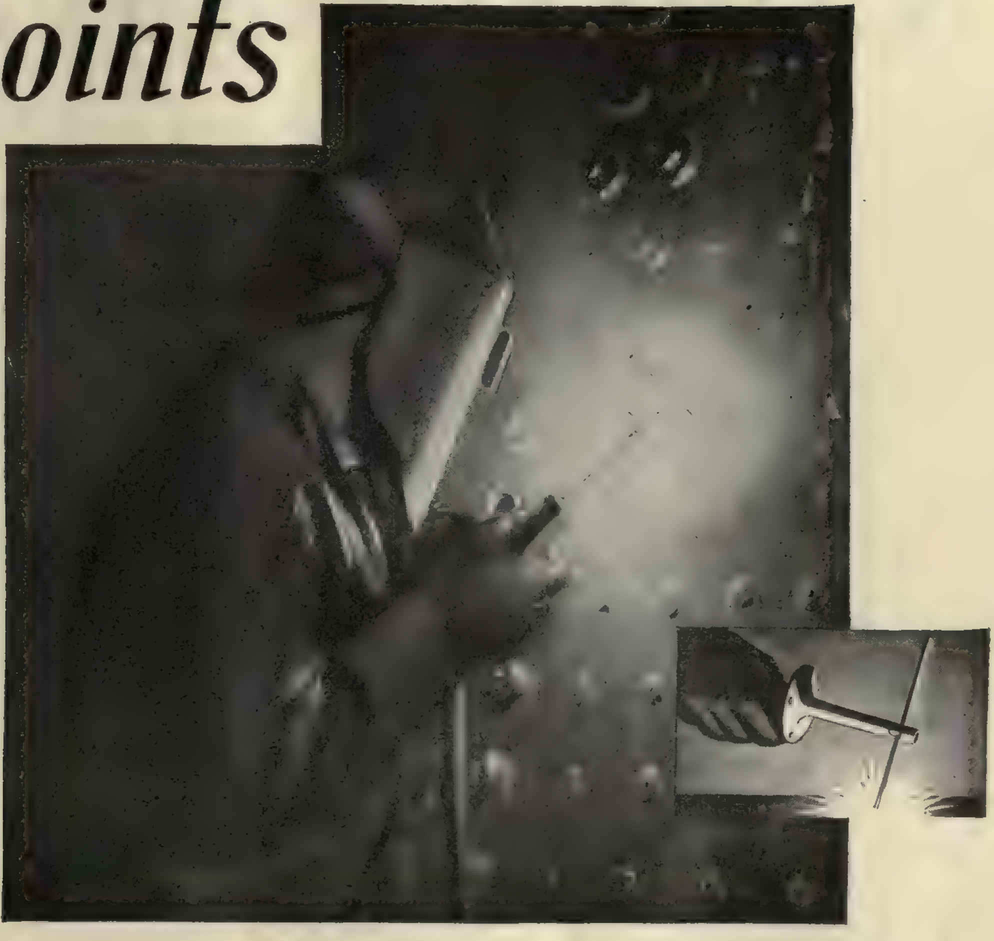
It can be of equal service in your fleet — and once you have tried it you will never change to another gasoline. Remember it's the only premium gasoline sold in New York and New England, to which Ethyl fluid has been added.

SOCONY

GASOLINE . . . . SPECIAL GASOLINE *plus* ETHYL
MOTOR OIL . . . . AIRCRAFT OIL

STANDARD OIL COMPANY OF NEW YORK

Trust *this* metal *at* *vital points*



G-E ELECTRODES

For Every Welding Job

- Type A—For Cast Iron Only.
- Type B—For Automatic Welding.
- Type F—For General Welding of Steel.
- Type H—For Automatic Welding.
- Type L—For General Welding of Steel—High Tensile Strength.
- Type M—For General Welding of Steel—Sound and Ductile Welds.

G-E Type L Welding Electrode

At joints where strain may occur, you can be *sure* of welds made with G-E Type L Electrode. Its tensile strength is high; its cost low.

It is a bare wire . . . specially processed . . . possessing all the good characteristics of surface fluxed rods, and, *in addition*, it produces a fine bead finish . . . doesn't spatter.

General Electric experiments and long experience have made it dependable. Its flow is uniform . . . its penetration deep.

Write today for our booklet on G-E Welding Electrodes. Section M-815, Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

WELDING ELECTRODES

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONN.

Coördinated

The Gary Railways Company of Gary, Ind., operates 72 G-E equipped street cars. Many of these are of the modern type with G-E motors, G-E control, and G-E air brakes.

The Chicago Surface Lines specified G-E air brakes and PCM control for 100 new cars. Forty are equipped with GE-301, low-wheel motors.

PCM control, a recent development of the General Electric Company, provides automatically smoother and faster acceleration. For complete information, address the nearest G-E sales office.

G-E equipped trolley buses are operating economically in Salt Lake City, Utah, Philadelphia, Pa., Cohoes, N. Y., Rochester, N. Y., and Manila, P. I.

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Service . . . .

Increases Patronage
Reduces Operating Costs

THE MODERN STREET CAR, trolley bus, and gas-electric bus are equally important in their ability to attract riders, to serve them well, and to serve them economically. Each type of vehicle has its essential place in the modern coördinated system.

THE STREET CAR continues to be the most efficient carrier of crowds. For heavy traffic in large cities, it is the basis of an economical transportation system.

THE TROLLEY BUS is rapidly winning favor in the service of light-traffic areas. This trackless vehicle is quiet and powerful. It retains all the economies of electric power and it effects a substantial reduction in paving charges.

THE GAS-ELECTRIC has demonstrated its ability to conform to changing traffic demands. The public appreciates its fast schedule speeds. Operators profit from its long life and availability.

The Capitol District Transportation Company operates a fleet of 76 gas-electric buses in Troy and Albany, N. Y., where the routes are characterized by steep grades and heavy traffic. All the electric-drive equipment is of G-E design and manufacture.

The Public Service Coördinated Transport of Newark, N. J., operates more than 1000 gas-electric buses equipped with G-E electric drive. In the design and manufacture of this type of equipment, General Electric has consistently led the field.

330-140

ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES

AMERICA'S LARGEST BUS SYSTEM Adds 180 More Gas-Electric Buses for City Service

AMERICA'S largest bus system, Public Service Coördinated Transport, of Newark, N. J., recently purchased 180 new city-type buses which will be equipped with General Electric gas-electric drive. These buses will augment a fleet of 1150 similar units now in operation, making a total of 1330 G-E equipped gas-electric buses in the service of this company. There can be no greater tribute to the performance of General Electric equipment.

While smoothness of operation and simplicity of control have contributed much to the success of G-E gas-electric drive, these features alone were never sufficient to win a place for the more than 2000 G-E gas-electrics now on the road. Economy of operation and the ability to increase schedule speeds have always been foremost among their advantages. We invite your interest. Write us. General Electric Company, Schenectady, N. Y.

For the seventh time, Public Service specifies G-E gas-electric drive for its city-service buses.

1.	**December, 1925**	**333**
2.	**April, 1926**	**54**
3.	**July, 1926**	**8**
4.	**March, 1927**	**108**
5.	**February, 1928**	**332**
6.	**February, 1929**	**161**
7.	**February, 1930**	**180**
		1176
		154*
	Total Gas-electrics	**1330**

*** Public Service also operates 154 G-E equipped gas-electric buses acquired through consolidation with other companies.**

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

390-63

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

John A. Miller, Jr., *Managing Editor*

Volume 74 New York, May, 1930 *Number* 5

Business Prospects Brighter

MOST authorities agree that the low point in the present business recession has been reached and that an upward trend will be witnessed during the coming months. Employment in manufacturing industries in March was a little lower than in February and nearly 9 per cent below March last year. Department store sales for March were about 12 per cent below those of a year ago. Recent reports, however, show a moderate but material improvement during the first two weeks of April.

Electric railway traffic in March, 1930, showed a decrease of about 7 per cent as compared with March, 1929, while the decrease in February was only about 4 per cent and in January a little more than 1 per cent, according to figures compiled by the American Electric Railway Association. From this it appears that the decline in traffic has lagged somewhat behind the business decline and has been considerably less severe. This is in accord with predictions made last fall after the sudden stock market crash that electric railway and bus traffic was unlikely to suffer a very large recession.

Improvement in general business conditions appears to be definitely under way. Consumption of electrical energy by manufacturing plants is increasing. Construction programs of far-reaching extent are being accelerated. While it is too early as yet for the improvement to be reflected in reports of the number of passengers carried, electric railway operators are distinctly more optimistic than they were a few weeks ago. It may be expected that the upturn of electric railway traffic will follow the upturn of general business more closely than did the decline. A tendency exists to continue using public transportation for a considerable period after unemployment begins. Only after a man has been unemployed for some time does he cease to use street cars and buses. But when he goes back to work he immediately begins to use public transportation again. In other words, the period of depression in the local transportation industry will probably be much shorter than in other industries. It is not likely that normal conditions will be restored immediately, but every indication points to steady improvement continuing during the spring and summer months.

Serviceable But Not Suitable

CENTURIES ago in Egypt the slaves of the Pharaohs labored to build the gigantic pyramids which remain a marvel to this day. The Romans in their turn, with marvelous skill and care, constructed hundreds of miles of aqueducts, many of which are still in use. In the middle ages workmen labored with religious fervor to raise the lofty spires of the beautiful cathedrals which charm the modern tourists. Throughout practically the entire period of recorded history men have struggled to create monuments that would endure forever.

Today we have a somewhat different viewpoint. No serious doubt exists that modern skill can design and build structures to last for centuries, but we seldom consider it desirable to do so. A new factor, one that did not bother the ancients, has entered into our calculations—obsolescence. We have learned that a thing may remain serviceable long after it has ceased to be suitable. Hence we have very largely abandoned the idea of building for eternity.

In the field of transportation this modern viewpoint finds particularly apt application. Possibly we might be able to design a vehicle like the famous "one hoss shay" that ran a hundred years to a day before it fell to pieces. But it is impossible to believe that the public would patronize it for anything like that length of time. Possibly we might design a track structure which with proper maintenance would last for generations, but it is extremely unlikely that we would find it satisfactory as to location, line, grade, etc., for so long a period.

Obviously, then, the wise plan is to design our structures and equipment with a certain definite objective in view. If replacement is anticipated at the end of ten or fifteen years, the best design is that which will assure the desired length of life with a minimum surplus. Engineers today should pride themselves on their skill in designing to accomplish a definite purpose rather than in the creation of monuments for posterity.

Small-City Properties Appraise Their Assets and Liabilities

THERE is no magic formula for success in small-city street railway or bus operation. Decreases in traffic have been experienced by many of the properties that are found in this class. Burdensome franchise requirements, inequitable taxation, onerous paving obligations, inflexible fare structures, top-heavy financial setups, unregulated taxicab operation and, above all, the competition of the privately owned automobile, have contributed to the troubles of the small-city railways. Yet for none of these ills is there an unfailing remedy. Each property must solve it own problems by a careful study of existing conditions.

In spite of the difficulties which the small-city property has encountered and with which it is still beset, there is good reason for a continued faith in the future of organized transportation in these communities. Without question there is less demand on the part of the public for this commodity than there was a few years ago. At the same time there is a marked reluctance to see the time-tried utility reduce its service or liquidate its plant. The local transportation system, be it bus or trolley, is still regarded as a community asset, and the extension of service into newly developed areas now, as in the past, meets with favorable public response.

The brighter side of the picture is presented by those properties which have introduced aggressive merchandising methods in the sale of their service. This has taken the form of careful study of the fare structure, balancing service to meet the requirements of the public more satisfactorily, modernization of rolling stock, cultivation of improved public relations, and energetic solicitation of patronage from potential riders.

Certain instances will be found in which local remedies, available to all, have been applied with a considerable degree of success. While there is a general lack of adequate merchandising effort there is an awakening interest in this subject. Public relations are, broadly speaking, on a better basis than in the past, and municipal authorities are listening with increasing attention to appeals for relief from unnecessary burdens.

Such, in effect, were the conclusions reached at a three-day meeting of the committee on small-city operations held recently in New York.

If the "small city" hearings demonstrated any one thing, it was that we are living in an era of change and progress, in which the transportation industry, along with many others, must change its methods to keep in step with the changing tempo of events or face serious consequences.

Rhode Island Regulates the Taxi

RHODE ISLAND has followed Connecticut in placing the taxicab under responsible state regulation. For many months now the taxi situation in Providence and elsewhere in the state has been chaotic. In the operation of these vehicles there has been neither law nor order. The new legislation has behind it the thought that the taxi has a distinct place in the transportation field as a service to which the people are entitled, but the regulatory measure was enacted to correct conditions which had become a menace to the public welfare.

Under the new law the state utility commission is empowered to fix rates, specify service and stipulate the equipment needed. This is as it should be. That the United Electric Railways, Providence, advocated the regulation in no way militates against the soundness of its contention that cut-rate competition among the carriers is inconsistent. True, the earnings of the coordinated railway and bus system in Rhode Island were affected by the unfair cut-throat taxi competition, but the railway stands to profit in no way other than the removal of this unfair competition. If it seeks to enter the taxicab business itself the railway must prove the convenience and necessity of any lines it would run.

As in Connecticut, public regulation in Rhode Island should tend to raise the standard of taxicab service and eliminate cut-rate competition destructive to the taxi industry itself and harmful to the public by injuring a necessity service. Particularly does the requirement of public convenience and necessity guard the industry from internal destruction by those who would enter the field without any regard to the extent of taxicab service already furnished. That is sound doctrine. The public may patronize an unprofitable business while it lasts, but eventually the public pays the full penalty for the folly that permits unrestrained competition. In passing the new law the Legislature of Rhode Island has protected the taxicab operators against themselves.

Much Talk But No Progress Toward Unification

LEGISLATION looking toward unification of the rapid transit lines in New York City, including the new municipal subway system now nearing completion, has failed again at Albany. Under the proposed bill the city would have had the power to acquire privately owned lines and lease them together with its own new lines for unified operation, meeting from general taxation whatever deficits might result from the preservation of the sacred 5-cent fare. This proviso to permit the city to make up deficits from taxation was primarily responsible for the defeat of the proposal.

All along, the situation has been a mixture of politics and economics, two things that do not go well together. Both sides conceded that a 5-cent fare on the unified system was not assured unless the city received from the legislature authority to pay part of the cost of operation out of taxes. The majority in the legislature stood firmly against the unification bill unless this subsidy was eliminated. The mayor, however, would not consent to the elimination of the subsidy and the law makers therefore refused to pass the enabling legislation.

Since the legislature has adjourned without action, the city will be required under the existing law to charge a fully compensatory fare on its new lines after a development period of three years. Thus it appears that the nickel fare is doomed on these lines anyway, unless, as commentators on the situation point out, privately conducted negotiations can bring about unification of the old low-cost lines with the new high-cost ones under expert non-political management which can stretch the nickel to cover the combined interest charges.

For the present the battle is ended, but it is not entirely clear who is the victor. The majority in the legislature has won its point concerning the subsidy. The mayor, however, by the failure of the desired legislation has secured an alibi in the event of future difficulties. One thing that seems certain is that the public continue to lose by the further postponement of unification.

To Protect or To Harass?

CONSIDERATION is being given at present in a number of plans to the question of creating the office of "Peoples' Counsel" to represent the public in utility hearings before regulatory bodies. In a few communities this has already been done. It is difficult to see what good is to be accomplished by this plan. Its proponents claim that the utilities employ high-priced legal talent to present their side of the case and that the public should be equally well represented.

Everyone will agree that the interests of the public should be fully protected at hearings of this kind, but that scarcely seems sufficient reason to create a new office when nearly every town, city and state already has its legal staff. These lawyers are the logical persons to represent the public interest before regulatory bodies. If they are too busy with other matters, or are not properly qualified in questions of utility law, it is an easy matter to employ special counsel to handle any particular case. This has been done in many instances with excellent results.

If a "Peoples' Counsel" is created for the express purpose of representing the public at hearings before the regulatory commission, a question immediately arises as to what he will do to keep busy in the intervals when no cases are under consideration. To this the most likely answer seems to be that he will occupy himself prying into the affairs of the utility to see if he can find something to criticize. Such procedure is entirely contrary to the fundamental principles of American government. In this country it has always been held that it is not the function of government to delve into the affairs of individuals and business concerns on the mere chance of uncovering evidence of wrong doing. The records of the public utilities are open to public inspection, and there is little reason to anticipate that a "Peoples' Counsel" would unearth dark deeds that have long laid hidden. It is very likely, however, that he would become a good deal of a nuisance and that the answering of his questions would waste a large amount of time and energy that might much better be devoted to the operation of the property. Probably he would feel that he had to make trouble in order to show that he was earning his salary. All in all the conclusion is inescapable that the real motive underlying the creation of such an office is not to protect the public but merely to harass the utilities.

The Growing Need for Public Transportation

SO MUCH is heard these days about the growing use of private automobiles that the growing need for public transportation receives relatively little attention. Yet this need is actually increasing year by year despite the remarkable development of the automotive industry and the multiplication of two-car families and even three-car families.

Fifty years ago more than 70 per cent of this country's population was rural. Just prior to 1920 a balance was reached between urban and rural population, each being approximately 52 million. During the past decade it is estimated that urban population has increased about 16 million and rural population not more than 2 million, making the present ratio about 55 to 45. If this trend continues, as there is every reason to expect, the relationship existing in 1880 will be completely reversed by 1965 when more than 70 per cent of the total population will be urban.

Inasmuch as the largest part of the public transportation business is done in the urban communities, this shift of population is very significant. It means a steady increase in the number of potential customers. Moreover, experience has shown repeatedly that the riding habit on public transportation vehicles tends to increase as the population increases.

Thus it is evident that future demands for public transportation are likely to be greater than those existing today, rather than less. Just what form this demand will take, whether it will be for street car, rapid transit, bus, trolley bus, or taxicab service, cannot accurately be forecast. Most likely it will be for a combination of these services, each doing the work for which it is best suited. Meeting this future demand will undoubtedly present many complex problems. Public transportation agencies cannot fold their hands, sit back, and wait for their business to grow. They must be constantly alert to keep pace with changing conditions and habits of living. If they are prepared to render service when, where and as wanted, there is every reason to expect that the demand for their service will steadily increase.

Higher Accelerating and Braking Rates Bring Faster Schedules

HIGHER schedule speeds for transportation vehicles are today more essential than ever before, if the competition offered by private vehicles is to be met. Speed always is attainable—at a price. Although the original appeal of the street railway was based on speed, transportation men have been content to hold down the cost and with it the possibilities for speedy rides that will attract the public. In general the equipment has been chosen for economy rather than for the possibility of making fast schedules.

Examine for a moment the factors that determine the schedule speeds for runs such as are met in surface or ordinary rapid transit service. These principles, by the way, apply equally to electric cars, buses and steam trains. The factors are the rate of acceleration, the rate of braking, and the time consumed in stops. The last factor is determined by the location and arrangement of the stopping places, the number of passengers on and off, and the load already on the vehicle. It is influenced to a considerable extent by the design of the vehicle and the arrangement of doors and steps. Few of the older vehicles are properly arranged to permit quick loading and unloading.

Seldom is it realized that the maximum speed at which the motive power can drive the vehicle can have little effect on the schedule possibilities because the ordinary run is too short. The fastest run that can be made between any two points demands the highest possible rate of acceleration for a portion of the time, followed by the highest rate of braking for the remainder. It is only when the run is so long that it is uneconomical to keep up the maximum acceleration that the speed characteristic has any influence. In order to make a schedule practical for use day after day there must be some reserve. Ordinarily this is obtained by allowing the vehicle to coast for a certain portion of the time.

For short runs—and in this class falls practically all surface and rapid transit service—the equipment should be chosen solely from the standpoints of acceleration and braking. High braking rates ordinarily are less difficult to attain, and cost less for the equipment and for its operation, than equal rates of acceleration. The only practical limit to the rate of braking is slipping of the wheels. It is surprising that higher rates of braking are not used regularly in service. Passengers are not inconvenienced by rapid braking if the equipment is properly designed and properly handled.

Acceleration is determined by the tractive effort used in proportion to the weight of the vehicle. The horsepower is involved only indirectly. Hence reduction in the weight of the vehicle is just as valuable in getting higher accelerating rates as increasing the size of the motive power. Before deciding to use heavier motors, then, every attempt should be made to reduce the weight of the vehicle. This in turn keeps down the weight of the motors themselves, so that there is a reciprocal advantage.

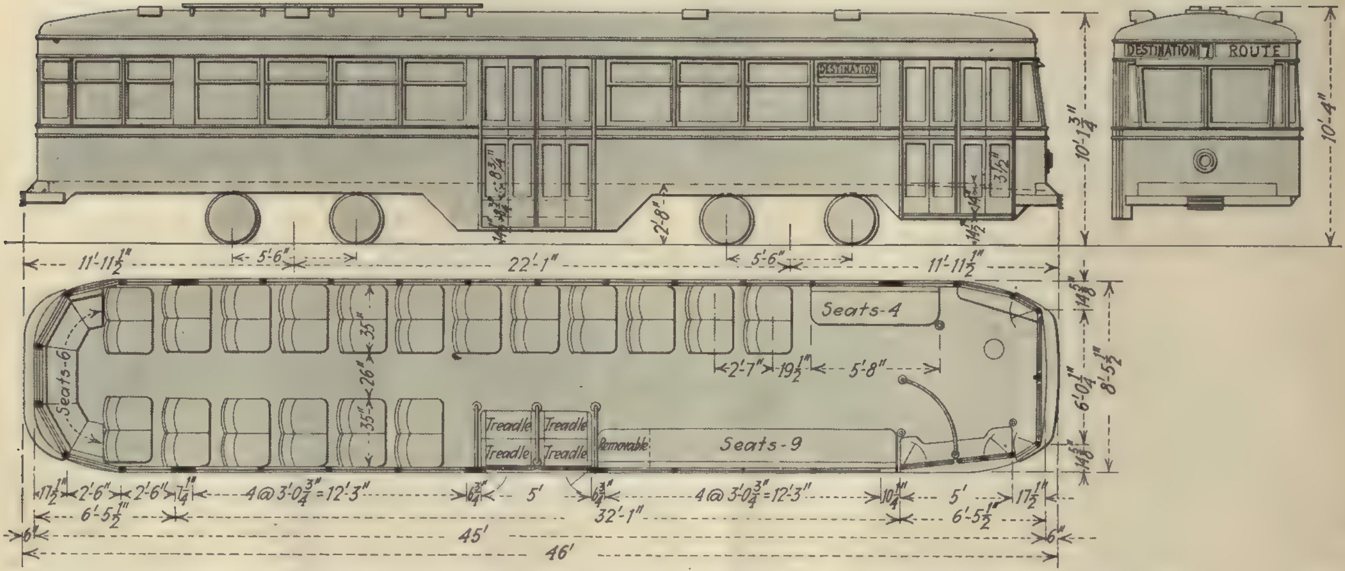
Even the most recent designs of cars fall far short of reaching the practical limits of acceleration and braking. Every attempt should be made by vehicle operators and manufacturers to build designs that will give acceleration and braking rates in line with the trends of today. Otherwise the transportation business is bound to suffer.

Extensive Rolling Stock Reha

By

DEAN J. LOCKE *and* **A. T. CLARK**

Research Engineer **Superintendent of Equipment**
United Railways & Electric Company of Baltimore



United Railways & Electric Company of Baltimore has recently placed orders for 150 new single-end, front-entrance, center-exit cars of this design seating 55 passengers

1930 Transportation Service for 1930

THIS is now the Baltimore motto in executive offices, shop, carhouse, power station, bus garage and "out where the rush begins." During the summer 150 new cars will be placed in operation and 262 present-type cars will be completely rejuvenated, from running gear to roof. This extensive program of rolling stock rehabilitation has been made possible by the recent favorable decision of the United States Supreme Court in the Baltimore fare case, which permits the company to charge a straight 10-cent fare for all adult passengers.

There is more to the 10-cent straight fare, however, than just "getting it" and then collecting it. That part of the problem arising from the widespread use of the automobile for personal transportation does not disappear just because it suddenly begins to cost 10 cents to take a street car ride. Automobile users don't mind paying more for transportation—they wouldn't be using automobiles if they did mind—but they want something for the money.

For a year previous to the conclusion of the "Baltimore fare case," thousands of tests of the present-type cars and of numerous remodeled cars were made, both on the specially designed test track and in regular service, in anticipation of the favorable decision, for the purpose of determining what the design and performance of new cars should be, and how the present cars could be operated more effectively.

The new cars will be of the double-truck, single-end, front-entrance, center-exit type, having an over-all length of 46 ft. All of the cars will be mounted on Brill 177-E-1 trucks with 5-ft. 6-in. wheelbase and 26-in. rolled steel wheels. Each car will have four 50-hp. motors, either Westinghouse 516-A or General Electric GE-301. Automatic control of the PCM and VA type will be used, in order to obtain a smooth acceleration of 3.25 m.p.h.p.s. The total weight is expected to be about 39,000 lb. The J. G. Brill Company will build 100 of the bodies and the Cincinnati Car Corporation will build 50.

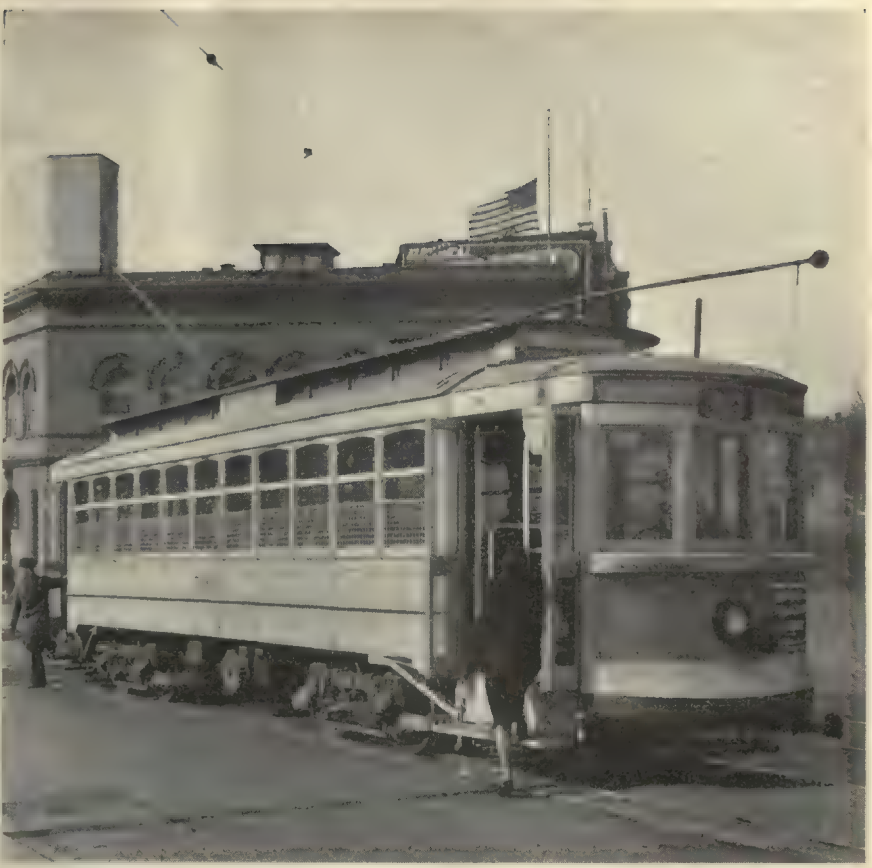
Westinghouse air brakes will be used, designed to stop the car at a rate of 3.5 m.p.h.p.s. with a load equal to three-quarters of the seating capacity. This is made possible through use of the new Type M-33 self-lapping motorman's valve, a 12x12-in. brake cylinder, and brake rigging designed with 150 per cent ratio. Doors and brakes will be pneumatically interlocked. The trucks are designed so that track brakes may be attached should it be found desirable to do so at some future date.

While the new car is intended primarily for one-man operation, two men can be used if desired. The center exit doors fold outward and are independently controlled by two automatic treadle plates. Manual operation can

ilitation

At Baltimore

New cars quickly ordered following fare increase are designed for comfort and speed. In addition to the 150 new cars, 262 of the present cars will be rebuilt during 1930. Rates of acceleration and braking will be nearly doubled, and free running speed increased 25 per cent. Pneumatic door control and safety devices to be installed



Remodeled car is arranged for one-man operation, entrance being at the front and exit at the rear by means of a treadle door

be substituted for treadle operation on these doors, however, when a conductor is used on the car. The front entrance doors fold inward into a step well.

Seating accommodations for 55 passengers are provided. The seats are of the semi-bucket type arranged in twelve pairs on the left side of the car, with six additional pairs on the right side of the car in rear of the exit door. A curved seat at the extreme rear seats six and a longitudinal seat on the right side between the front and center doors will accommodate nine passengers. Opposite the entrance door is a short longitudinal seat for four passengers. This arrangement was adopted because it was believed to be the most advantageous for rapid loading. All seats will be upholstered in leather. Above the longitudinal seats enameled hand rails are provided for the convenience of standing passengers, while large enameled grab handles are available on the high backs of all the transverse seats. The floor will be level throughout except for a 2½-in. ramp at the front end. It will be without trapdoors and will be covered with $\frac{3}{16}$-in. battleship linoleum.

The car roof will be of plain arch type with ten ventilators arranged in two rows. There will be ten wide windows between the corner posts on the left side and eight on the right side, as well as six windows above the curved seat at the rear, and one on the left side of the front platform. The windows will be arranged in two sections, the upper sash being stationary and the lower sash designed so that it can be raised easily by a seated passenger. Sash frames will be of tubular brass. Artificial illumination will be provided by twenty dome fixtures arranged in two rows above the center line of the cross seats. Each fixture will be provided with a 36-watt lamp.

Analysis of Car Performance During Rush Hours, Fremont Avenue Line

	Old Single Truck Car	Remodeled Double Truck Car	Increase or Decrease	Per Cent Increase or Decrease
Number of stops made	71	71	0	0
Stops per mile	8.6	8.6	0	0
Slow downs	33	44	+11	+33.3
Total time in motion	47 min. 53 secs.	42 min. 15 secs.	—5 min. 38 secs.	—11.7
Total power-on time	24 min. 9 secs.	22 min. 39 secs.	—1 min. 30 secs.	— 6.2
Total coasting time	11 min. 22 secs.	8 min. 54 secs.	—2 min. 28 secs.	—21.6
Total interference time	3 min. 50 secs.	2 min. 36 secs.	—1 min. 14 secs.	—32.1
Total braking time	8 min. 32 secs.	8 min. 06 secs.	—0 min. 26 secs.	— 4.7
Average speed, excluding stops	10.3 m.p.h.	11.7 m.p.h.	+1.4 m.p.h.	+13.6
Average of maximum speeds of individual runs, excluding stops	13.1 m.p.h.	15.5 m.p.h.	+2.4 m.p.h.	+18.3
Average speed at power cut-off	12.1 m.p.h.	15.3 m.p.h.	+3.2 m.p.h.	+26.4
Average speed ten seconds after starting	11.5 m.p.h.	13.8 m.p.h.	+2.3 m.p.h.	+20.0
Average acceleration rate for first ten seconds after starting	1.15 m.p.h.p.s.	1.38 m.p.h.p.s.	+0.23 m.p.h.p.s.	+20.0
Average speed at brake application	11.4 m.p.h.	13.9 m.p.h.	+2.5 m.p.h.	+21.9
Average braking rate	1.53 m.p.h.p.s.	2.05 m.p.h.p.s.	+0.52 m.p.h.p.s.	+34.0
Weight of car	27,700	43,600	+15,900	+57.4
Seats in car	41	50	+9	+22.0
Kilowatt-hours	24	32	+8	+33.3
Kilowatt-hours per car-mile	2.90	3.87	+0.97	+33.4
Watt-hours per ton-mile	165	155	—10	— 6.1

The front end of the car will be of the so-called automotive design with comparatively little curvature. The front vestibule window will slope inward at the top, and will be divided into two sections so arranged that one section will slide in front of the other, to give the operator unobstructed vision in foggy weather. Non-shatterable glass will be used in the sliding portion. Two mirrors are provided for the operator, one showing the interior of the car and the other arranged so that he can see what is happening at the center exit doors.

EXISTING CARS REMODELED

Coincident with the making of plans to purchase these new cars it was decided to remodel a considerable number of the cars now in service. The cars chosen for remodeling are of the double-truck, double-end, semi-convertible, two-man type, seating 47 passengers. Besides increasing the acceleration and braking rates, the remodeling involves also the elimination of doors on the left side of the car, the removal of control at one end and the installation of pneumatic door-operating devices. A single notch controller and straight air brake will be placed at the rear end for backing up and emergency movement. The remodeled cars will have double entrance doors at the front end and single treadle-operated exit doors at the rear. So arranged, they will be suitable for one-man operation. Other plans provide for the conversion of the present-type car into articulated units.

Interior of remodeled Baltimore car, showing fourteen double cross seats, with curved seat on rear platform and longitudinal seat opposite entrance

Electric fare box for coins of three different denominations, Type M-33 self-lapping motorman's valve, motor field shunting and dead man control are features installed on the remodeled cars

As remodeled, the single car weighs 43,600 lb. and seats 50 passengers. It is mounted on Brill 27-GE-1 trucks and is equipped with K-35 controllers and four GE-200-I, 40-hp. motors. The accelerating rate has been increased from 1.75 to 2.70 m.p.h.p.s. by shunting the motor fields on the third and succeeding points of the controller and by improved manipulation of the controller. The braking rate has been increased from 1.75 to 3.00 m.p.h.p.s. by installation of the Westinghouse Type M-33 self-lapping motorman's valve, by substitution of a 12x12-in. brake cylinder instead of a 10x12 in., and strengthened brake rigging to give a 150 per cent braking ratio instead of 100 per cent.

The shunting of the fields increased the free running speed from 27 m.p.h. to 33 m.p.h. These changes have resulted in a decrease of 9.7 per cent in the actual running time between terminals of the Fremont Avenue line which, was equipped with twenty rebuilt cars during the latter part of January of this year. While this comparison is between services with old single-truck, two-motor cars and remodeled double-truck, four-motor cars, it is indicative of the improvement produced by the remodeling of the double-truck type of car, since the original speed of the car before being remodeled was no better than that of the single-truck car.

In making the studies preparatory to remodeling, a portable testing set was used to secure a graphical record of car performance throughout the entire day's normal operation. This set records automatically on a 7-in. moving strip of paper, superimposed graphs of car speed, line voltage, current demand and air-brake pressure, and indications of distance run in 100-ft. increments, time elapsed in five-second increments and location of stops. The set is mounted on a cross seat and is supervised by one observer, who records on the chart data pertaining to the run, with particular reference to any abnormal conditions encountered. Separate instruments record kilowatt-hours of energy consumption and power-on time.

In the routine procedure of analyzing a line, the set was first installed on a car which had not been rebuilt. A sufficient number of regular service runs were covered to give accurate data on peak and off-peak average operating conditions. After the data had been obtained

Comparison of Old and New Operating Schedules, Fremont Avenue Line

	Schedule		Increase or Decrease Made by New Schedule	
	Old	New	Amount	Per Cent
Average speed between terminals	7.82 m.p.h.	8.68 m.p.h.	+0.76 m.p.h.	+ 9.7
Car-hours	217.5	206.9	—10.6	— 4.9
Car-miles	1,480	1,552	+72	+ 4.9
Seat-miles	60,680	70,600	+16,920	+27.9
Capacity-miles	81,400	116,400	+35,000	+43.0
Ton-miles	25,300	37,600	+12,300	+48.6
Base headway	7½ minutes	7 minutes	—½ minute	— 6.7
Peak headway	3 minutes	3 minutes	—0	— 0.0
Cars required on peak	20	18	—2	—10.0
Cars required on base	10	9	—1	—10.0

an analysis was made of the time consumed at stops and between stops. Data pertaining to the car itself, the passengers and external influences were segregated. Similar runs were then made with a remodeled car operated on the line with old cars and from the data obtained similar facts were developed, due allowance being made for handicaps imposed by the older cars and the slower schedule. Midnight runs were then made with both old and rebuilt cars loaded to seating capacity, the cars being operated by the motorman instructor at the greatest possible speed consistent with safety and good operating practice. Stops were made as in regular rush-hour service. The data from all these runs, after being properly analyzed and summarized, indicated the running times of the rebuilt car for different periods of the day. These were incorporated in a new schedule to provide the service on the line when fully equipped with rebuilt cars. By this means the number of cars required, the operating costs and savings were determined accurately in advance, and a new schedule was made up.

With the installation of a schedule involving new operating technique, new equipment and materially reduced running times, a follow-up program was necessary to eliminate mechanical difficulties and to allow the operating force to become fully accustomed to the new conditions. In this program the car testing set was used to analyze the performance of individual operators, thus assisting the chief motorman instructor to determine which motormen had difficulties in operating the remodeled equipment.

An accompanying tabulation shows operating conditions with both old and rehabilitated cars on the Fremont Avenue line, which was entirely equipped with this type of rolling stock. It indicates the degree of accomplishments possible on other similar lines of the Baltimore system.

Public Service Suburban Bus Terminal in New York City

In the heart of the retail shopping district of New York City, a terminal has been established by Public Service Co-ordinated Transport for buses running to suburban towns in New Jersey. The location is on the south side of 40th Street, about 100 ft. west of Fifth Avenue, and opposite the New York Public Library. At this convenient spot attractive and comfortable facilities have been provided for waiting passengers. A ticket agent is on duty inside the terminal, while a starter on the street regulates headways and announces the departure of buses.

All street car and bus routes operate either to or on Main Street

Income Increased by CO-ORDINATION *at*

ON THREE occasions within the past five years, municipal and state highway paving programs have included routes over which the Poughkeepsie & Wappingers Falls Railway operated street car service. Franchise obligations demanded the company's participation in these programs if street car operations were to be continued, and meant the expenditure of large sums of money for the rehabilitation of the track area. The only alternative was the substitution of buses for street cars. In two instances this substitution was made, while in the other it was decided to continue car operation.

The railway assumed its share of the repaving costs on Main Street and, in addition, completely reconstructed the track and overhead equipment. On the local south side line in Poughkeepsie and on the interurban route between Poughkeepsie and Wappingers Falls, car operations were abandoned and buses put into service in the community for the first time.

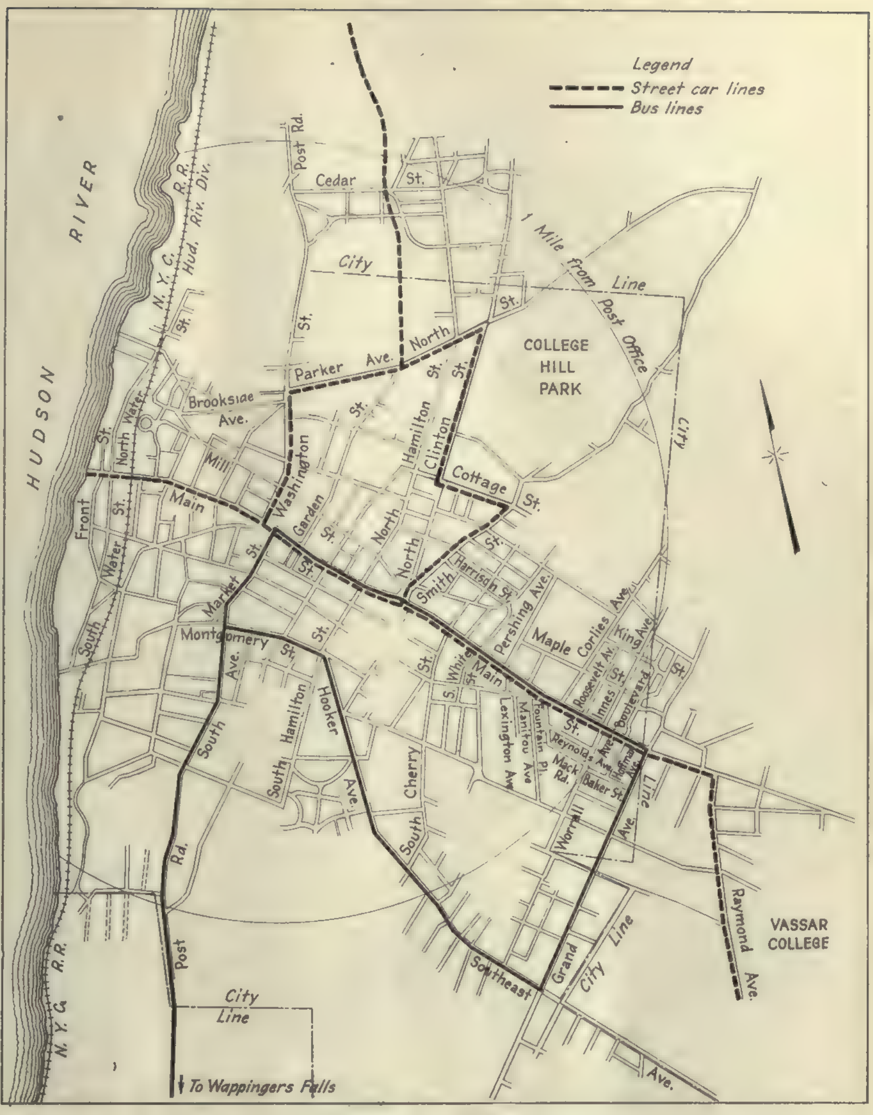
Particularly significant was the substitution of buses on the interurban line because of its effect on both the economic and operating conditions of the system. This substitution released approximately 7 miles of private right-of-way which was sold, the proceeds of which were used to retire all claims held by the City of Poughkeepsie for the repaving of Main Street.

The Poughkeepsie & Wappingers Falls Railway is owned by the Hinkley family, two members of which, Mrs. M. M. Hinkley and Miss Mary Hinkley, participate actively as president, and vice-president and treasurer respectively. Operation of the company is under the direction of Hemphill & Wells, consulting engineers of New York City, with John A. Nilan as resident manager. The area served has a population of approximately 40,000. One line now served by buses extends 7 miles beyond the city limits to Wappingers Falls, a town of about 3,000 residents.

The Main Street car line, covering a route of approximately 3 miles, is the most important and profitable operation of the system. Its western terminus is at the Hudson River ferry landing from Highland, N. Y., across the river, and at the railroad station of the New York Central Lines. From that point the line runs directly through the main street of the city, on which are located all of the business, shopping and theatre districts, thence through a residential section terminating at Vassar College. Service is supplied by 32-passenger Birney cars operating on headways of eight minutes until noon, six minutes from noon until 9 p.m., with two additional trippers in the evening rush hour, and then eight minutes until midnight. Eight cars are used on the six-minute schedule. All the cars are in good condition and are capable of many more years of service. Main Street was partially repaved in 1921 and completed in 1923, at which time complete rehabilitation of the track and overhead structures was effected, and it is estimated that no major changes will be made on them within the next ten or fifteen years. At the present time they are in excellent condition.

Larger revenue and lower operating expenses with material decrease in fixed charges follow partial substitution of buses for street cars. Prospects for future are good

Poughkeepsie



Reorganization of service in Poughkeepsie included rehabilitation of three street car lines and bus substitution on two others

The Main Street line is double-tracked over its entire length with the exception of several hundred yards at its eastern extremity on Raymond Avenue. On this avenue the route is on private right-of-way and open track construction is used. This route connects with all other bus and street car lines in the system and is duplicated for only a few blocks in its central section by the North Side car line and by the South Side buses. These partially paralleling services do not compete to any material extent with the operations of the Main Street line but draw their patronage almost exclusively from the north and south residential districts. General riding on Main Street is by street car.

As on all the other local lines, whether car or bus, the fare is 10 cents cash or one token which may be purchased at six for 50 cents. This fare has been in effect since May 9, 1925, at which time it superseded a straight 8-cent cash fare. Gross earnings per car-mile on this line since 1925 are shown in the following table in comparison to those on the other routes.

Gross Income in Cents Per Car or Bus-Mile, 1925-1929

	1925	1926	1927	1928	1929
Main Street	49.17	49.19	49.09	47.06	47.12
North Side	24.21	25.46	26.28	26.74	28.74
Hospital	34.14	34.80	32.37	33.33	33.97
South Side	28.90	27.57	26.10	29.18	31.52
Wappingers Falls	32.10	32.65	31.11	29.31	27.48
Average	37.88	39.04	38.45	38.11	38.37

In addition to the service on Main Street, the Poughkeepsie & Wappingers Falls Railway operates two additional street car routes in the northern section of the city, the North Side line and the Hospital line. The North Side line operates in a clockwise direction on a loop including a part of Main Street, Washington Street, Parker Avenue, North Street, North Clinton Street, Cottage Street, Smith Street to Main Street. As shown on the accompanying map of the city, this line adequately serves the residential section to the north of Main Street. Birney cars are operated on this line on a twenty-minute headway until 8 a.m., a ten-minute headway to 8:10 p.m. and a twenty-minute headway until 11 p.m. Two cars are used for the ten-minute headway, and one car is used to operate a twenty-minute schedule. The Hospital line operates from the intersection of Main and Washington Streets over the same route as the North Side line as far as the intersection of Garden Street and Parker Avenue, where it branches to the north and extends 1½ miles beyond the city limits to the Hudson River State Hospital. These routes are built with single track with the exception of that portion of the route that is common to both lines on Washington Street and Parker Avenue, which has double tracks. The lines are not co-ordinated in any way, the Hospital line using one Birney car running on a half-hourly service throughout the day, and the North

Earnings and Expenses of Poughkeepsie System, 1925-1929

	1925	1926	1927	1928	1929
Gross revenue.........	$262,118	$269,384	$263,853	$252,367	$256,740
Operating expenses and taxes..............	188,120	191,227	172,755	158,362	164,052
Net revenue........	$73,998	$78,157	$91,098	$94,005	$92,688
Interest charges and depreciation........	109,662	109,108	106,671	106,308	89,263
Net income (*deficit*).	*$35,664*	*$30,951*	*$15,573*	*$12,303*	$3,425

Side line operating on a schedule as previously described. Service on the Hospital line, previous to the term of the present management, was rendered by heavy type cars, with two-man operation. Birney cars replaced the old cars on this line and one-man operation was put into effect. This change was one of the major economies effected by the new management.

General offices, carhouse and garage are grouped in one building, centrally located on Main Street

Introduction of bus service was first made on Oct. 10, 1928, by the substitution of buses for street cars on the South Side line, shown on the accompanying map. A portion of the route on this loop was in need of repaving and it became necessary for the company to make a decision between a large expenditure for its share of this work or the substitution of buses for cars. Bus service was decided on after a careful study of the operating costs of such vehicles and the sentiment of the residents on the south side of the city. At the present time, two A.C.F. 23-passenger buses operate in both directions on this loop, maintaining a fifteen-minute headway throughout the day. The operation of modern, comfortable buses over this new pavement has proved very satisfactory from both company and customer standpoints. Since its inauguration, patronage has constantly increased. From a gross income of 26.10 cents per car-mile in 1927, the same route produced 31.52 cents per bus-mile in 1929.

In addition to the local services described, the Poughkeepsie & Wappingers Falls Railway operates an interurban bus line between the business section of the city of Poughkeepsie and the town of Wappingers Falls, located 8 miles to the south. One and one-half miles of this route is located within the city of Poughkeepsie itself and the remainder of the route is on the Post Road, which will be rebuilt in 1930. Previous to November, 1928, service on this route was carried on by light-weight, double-truck interurban cars which were doing a good business and holding patronage. The substitution of buses for this street car service was deemed desirable because a great portion of the route was included in a state highway paving program. The right-of-way from Poughkeepsie to Wappingers Falls laid adjacent to the South Post Road, which was to be widened and repaved for the new highway. From the state's standpoint, it was more desirable to acquire the private right-of-way than property on the other side of the road, since the street car line was at approximately the proper grade for the new road and was cleared of all obstructions such as trees, embankments and the like. Furthermore, acquiring this strip of land would relieve the state from the necessary condemnation proceedings of properties on the opposite side of the road. Consequently it seemed to be good business on the part of the Poughkeepsie & Wappingers Falls Railway to sell this right-of-way to be included in the new highway. The proceeds from the sale of this land materially affected the financial status of the company,

Operating and Traffic Statistics, Poughkeepsie System, 1927-1929

	1927			1928			1929		
	Cars	Buses	Cars and Buses	Cars	Buses	Cars and Buses	Cars	Buses	Cars and Buses
Total vehicle-miles	530,577	42,842	573,419	497,110	51,687	548,797	386,687	169,326	556,013
Passengers									
Revenue	2,153,998	128,768	2,282,766	1,998,859	176,815	2,175,674	1,651,768	545,195	2,196,963
Transfer and free	194,971	16,332	211,303	178,014	20,112	198,126	138,106	44,624	182,730
Total	2,348,969	145,100	2,494,069	2,176,873	196,927	2,373,800	1,789,874	589,819	2,379,693
Cents per vehicle-mile									
Gross revenue	38.88	28.91	38.13	38.75	32.71	38.18	41.88	29.26	38.04
Operating expenses	23.16	22.40	23.10	22.33	20.57	22.16	24.90	17.14	22.54
Net revenue	15.72	6.51	15.03	16.42	12.14	16.02	16.98	12.12	15.50
Cents per revenue passenger									
Gross revenue	9.58	9.62	9.58	9.64	9.56	9.63	9.80	9.09	9.63
Operating expenses	5.70	7.45	5.80	5.55	6.01	5.59	5.83	5.32	5.70
Net revenue	3.88	2.17	3.78	4.09	3.55	4.04	3.97	3.77	3.93

as the money was used immediately to retire all paving claims held by the city of Poughkeepsie for its previous repaving of Main Street. At the present time, semi-de luxe, 29-passenger A.C.F. buses are used on this line and operate on a time-table schedule averaging a trip about every 40 minutes each way throughout the day. The through fare on this line is 30 cents cash, or 25 cents if tokens are purchased. Weekly commutation tickets of six round trips cost $1.75; school tickets of 50 trips may be purchased for $6; monthly half-way tickets from Poughkeepsie with 26 round trips are sold for $5.20; as well as half-way school tickets of 100 trips for $6. The gradual increase in riding on this line has been steady since the introduction of bus service.

Careful study of the operating statistics and revenue tables included with this article will show a material improvement in the operating and financial structure of the company within the past few years. Most notable are the reductions in operating expenses and interest charges. The operating expenses were reduced principally in the following way: by taking off the heavier two-man cars on the Hospital line and the substitution of light-weight Birney cars with one-man operation; abandonment of a considerable amount of track and overhead and the reduction of maintenance forces; rearrangement in the office personnel and the saving of energy required due to the abandonment of heavy cars for lighter units. An unusual economy, effected at the time of bus substitution and the abandonment of track and line equipment, was the combination of garage and line forces. At the present time the garage force is trained in line maintenance and in an emergency is rushed out to take care of any breakdowns. The reduction in interest charges was the result of the sale of real estate on the Poughkeepsie & Wappingers Falls line and the paying of old paving debts from the money derived from this sale.

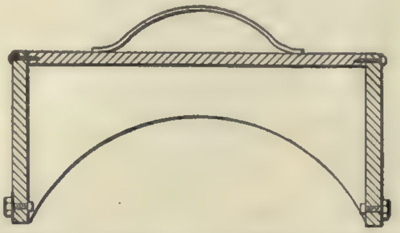
Within the past few years particular attention has been paid to accidents and their reduction, resulting in further economies of operation. A safety contest was started in the latter part of 1927. The crews are divided into four teams, each headed by a captain elected by the operators. The captains choose their men for the teams, which serve together for one contest period covering three months. At the first of each month a meeting is held by the captains and the manager, and every accident for the previous month is analyzed. If the accident is found to be the fault of the operator, it is charged against him and his team. At the end of the contest period a prize is awarded to the winning team, and a smaller prize to the operators on the losing teams with a "no chargeable accident" record. There is very keen competition for these prizes among the men, and the safety program has materially helped to reduce the number of accidents to a minimum. For the last fifteen years the annual average cost of accidents, including legal expenses, has been in excess of $5,000, whereas the cost for 1928 was $3,442 and in 1929 $3,075, so that in spite of the increasing number of automobiles operating over the narrow streets in Poughkeepsie, the company has been able to reduce the annual accident expenses during the last two years. The company has accrued, since 1912, 2 per cent of its gross income for accident claims.

With the present street car lines and two bus routes, the Poughkeepsie & Wappingers Falls Railway is efficiently furnishing adequate transportation in Poughkeepsie. The substitutions thus far made have strengthened the economic and operating conditions of the company, with the result that the system is operating on a profitable basis that seems likely to continue. What will become of the existing car lines when reconstruction becomes necessary in the distant future is not yet determined. Further substitution of buses could be effected without any appreciable change in riding habits or service, as bus capacities are comparable to the size of street cars now being used. With rolling stock, track and overhead structures in good condition on the car lines and comparatively new equipment on the bus lines, operations are stabilized for at least ten years.

◆

Adjustable Commutator Sander

FOR sanding commutators of various sizes, the device shown in the accompanying illustration has many advantages. A holder is built up of three pieces of wood and a strip of sandpaper is fastened between its two ends with bolts as shown. The arrangement allows the sandpaper to adjust itself to the curvature of the commutator regardless of the diameter. When the device is pressed against the commutator, the sanding action takes place over a much wider area than is possible with a solid block, and in the latter it is impossible to make the sandpaper bear evenly over the entire area. There are no hard spots to score the commutator as there may be when the solid block is used, and a satisfactory surface will be produced much more quickly.



Sandpaper stretched between the flexible ends of this holder adjusts itself to the surface of commutators of different sizes and bears evenly over the entire surface

Air-Magnetic Brakes Make Quick Stops

Combination of electric track brakes with standard air brakes reduces time and distance for making emergency stops as much as one-third

By H. A. Davis
Air Brake Engineering Department General Electric Company

Magnetic brakes of all types heretofore used can be classified in three general groups: (1) The solenoid brake, in which the armature of a solenoid transmits pressure to brakeshoes on the wheels; (2) the disk brake, in which a disk keyed to the axle is retarded by a stationary disk magnetically attracted to it; (3) the track brake, in which the shoes are electromagnets acting on the track rails and are mechanically connected to brakeshoes through a system of levers. Almost always, with each of the three forms, the current for energizing the magnet coils has been supplied by the car motors acting as generators. This has necessitated railway motors approximately 25 per cent larger than would otherwise be required and, usually, a special controller.

Recently a magnetic track-brake equipment has been perfected which consists of electromagnetic track brakeshoes, energized by trolley current and used in conjunction with and to augment standard air brakes. On a double-truck car, four, and on a single-truck car, two, electric shoe brakes are spring suspended, normally clear of the rails. When a magnetic brake application is desired they are set on the rails by means of small air cylinders. There is no mechanical connection between the electric shoe brakes and the wheel brake, and the air control for the shoe brakes is separate. It is assumed that the air brake will operate at full efficiency and the magnetic braking is additional to the best that can be obtained with air brakes alone. When the magnetic brake is applied, no weight is taken off the car wheels, so that the air brake is in no way impaired.

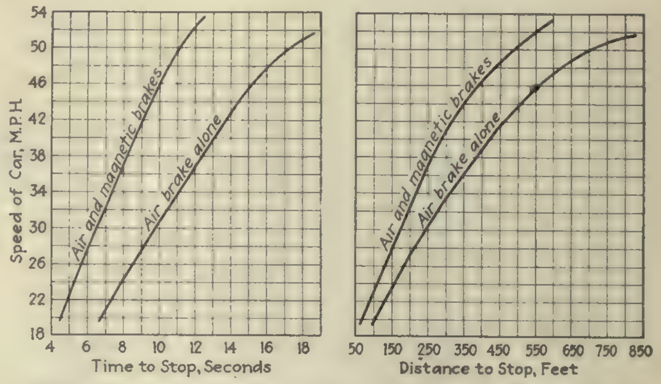
There are two distinct kinds of magnetic brake application. One is automatic and is made by an emergency application of the air brakes. The other is under the control of the operator and is for service stops. The control is so arranged that the magnets cannot stay energized indefinitely after either class of application, but the time is automatically adjusted to last longer than the time required to make these stops. The magnetic brake will, however, release immediately upon the release of the air brake after either a service application or emergency application of both the air and magnetic brake.

Magnetic track brake equipments of this type are now in operation on the following properties:

18 equipments—Buffalo & Erie Railway
41 equipments—Kentucky Traction & Terminal Company
3 equipments—Jamestown Street Railway
10 equipments—Indianapolis & Southeastern Railway
1 equipment—United Traction Company, Albany, N. Y.
1 equipment—United Railways & Electric Company, Baltimore
1 equipment—Third Avenue Railway, New York.

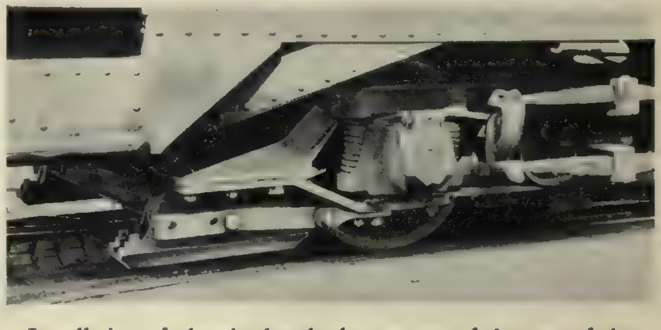
The electric shoe brakes now being built are fully saturated at approximately 20 amp. As they are connected in series, whether on a double-truck or a single-truck car, the current drawn from the line for a magnetic brake application is limited approximately to that value. The accompanying curves show the average result of tests comparing stops made with air and magnetic brakes with stops made with the air brakes alone. All the stops plotted were made by emergency applications.

Installation of magnetic brakes between the wheels of a double truck, as used on the new Albany car



Comparison of Average Results in Stopping with Air and Air-Magnetic Track Brakes

At left, relation of speed and time; at right, relation of speed and distance. The results were obtained in 28 emergency stops, 14 with air brakes alone and 14 with air and magnetic brakes. The tests were made on the Buffalo & Erie Railway on one of its double-truck cars equipped with standard air brake and safety car control equipment as well as with electric shoe brakes.



Installation of electric shoe brakes on one of the cars of the Buffalo & Erie Railway, of the type tested

Magnetic track brake equipments as described have the following advantageous characteristics:

1. Stopping time and distance are materially decreased. Companies using them have had a very satisfactory reduction in the cost of accidents.

2. As the current for energizing the electric shoe brakes is taken from the trolley, wheel sliding does not affect the efficiency of the magnetic brake. On the contrary, it is very beneficial on a slippery rail. Users have reported a decided decrease in the amount of sand used since magnetic brakes were installed.

3. The confidence of the operator is such that although he may not find it necessary to use the magnetic brake for the majority of service stops, he will know that it is available when necessary. He therefore will follow traffic much closer and take more nearly full advantage of the acceleration at his disposal than he would if his car were equipped with air brakes only.

Attaining Faster Schedules

in Rapid Transit Service

Factors that influence the speed of trains are analyzed. Lower car weight and four-motor equipments have possibilities for increasing schedule speeds at no increase in operating cost

By

W. J. CLARDY

General Engineer

Westinghouse Electric & Manufacturing Company

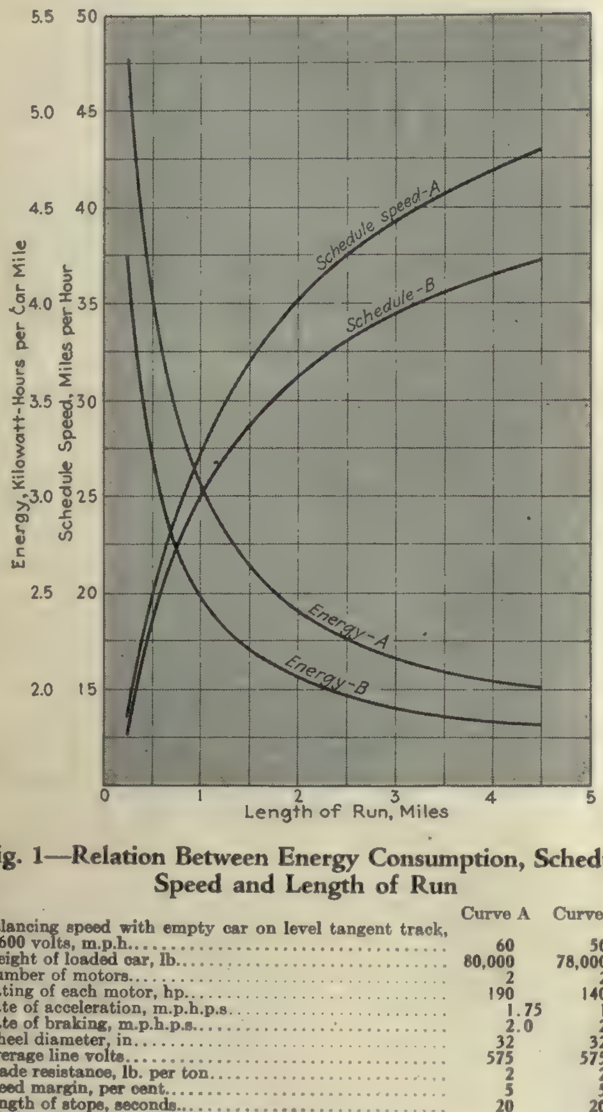


Fig. 1—Relation Between Energy Consumption, Schedule Speed and Length of Run

	Curve A	Curve B
Balancing speed with empty car on level tangent track, 600 volts, m.p.h.	60	50
Weight of loaded car, lb.	80,000	78,000
Number of motors	2	2
Rating of each motor, hp.	190	140
Rate of acceleration, m.p.h.p.s.	1.75	1.75
Rate of braking, m.p.h.p.s.	2.0	2.0
Wheel diameter, in.	32	32
Average line volts	575	575
Grade resistance, lb. per ton	2	2
Speed margin, per cent	5	5
Length of stops, seconds	20	20

Subway train resistance formula used.

HIGHER schedule speeds are desirable on rapid transit lines if this means of transportation is to retain its leading position as a means of travel in metropolitan centers. Many lines are now working at capacity during rush hours and still are unable to provide adequate service. An increase in schedule speed permits the use of fewer trains for a given service, increasing the efficiency of operation and offering a means of reducing expenses.

A number of factors affect schedules, but higher balancing speed, more rapid acceleration and braking rates and lower car weight are among the most important means of increasing speeds. Trolley voltage usually is fixed. Time of stops is not considered in this article.

The average length of run in subway or elevated operation is much greater than on surface lines, thus permitting the use of higher free running speeds. For a good many years rapid transit trains have been capable of maintaining balancing speeds 35 to 40 per cent higher than are encountered on surface lines. However, rapid transit cars are only 20 to 25 per cent faster than some of the surface cars recently brought out.

Naturally, it is just as feasible to use higher balancing speeds for rapid transit service.

An increase in speed requires more motor capacity and greater energy consumption, and it is well to consider the matter from the economic standpoint. Fig. 1 compares two subway equipments, one capable of maintaining a balancing speed of 50 m.p.h. on level tangent track at normal voltage, and the other 60 m.p.h. Schedule speeds and traction energy consumption are plotted for various lengths of run. For short runs energy consumption increases very rapidly with the balancing speed with a relatively small improvement in schedule speed.

In rapid transit service, it is impracticable to segregate cars used for local and express operation. This naturally leads to the selection of a compromise balancing speed in an effort to secure maximum operating economy for the combined service. A 0.5-mile run is representative of average local service. Comparison of the data in Fig. 1 indicates a schedule speed under the conditions stated of 18.5 m.p.h. for the 50-m.p.h. car as compared with 19.7 m.p.h. schedule for the 60-m.p.h. car, while the energy per car-mile increases from 3.24 to 4.01 kw.-hr. Thus 24 per cent more energy is required to obtain a 6.5 per cent greater schedule speed by the use of a higher maximum speed.

Express runs do not present a materially different picture. If an average of 1.25 miles is considered, which is typical for metropolitan rapid transit systems, the schedule speeds with the two equipments are 27 and 29.8 m.p.h. and the corresponding energy consumed per car-mile is 2.33 and 2.83 kw.-hr., respectively. Here 21.5 per cent more energy is required to realize a 10.3 per

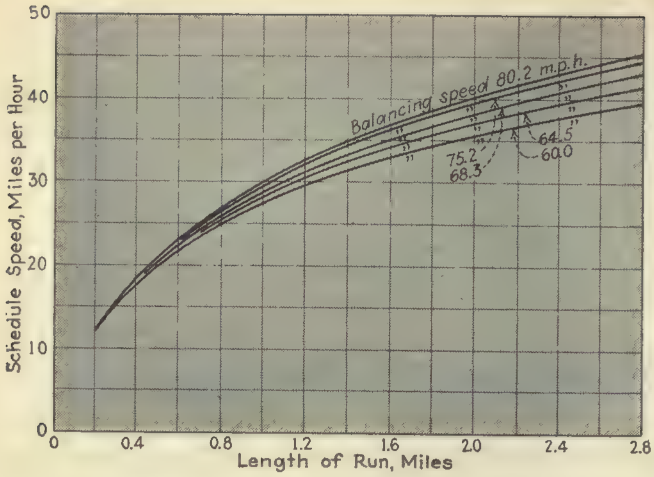


Fig. 2—Relation Between Schedule Speed, Balancing Speed and Length of Run, Three-Car Articulated Train

Weight of train, complete, lb	243,000
Weight of passengers, rush-hour load, lb	57,000
Total weight, lb	300,000
Average wheel diameter, in	35
Average volts at train	580
Equivalent grade and curve resistance, lb. per ton	3
Rate of acceleration, m.p.h.p.s	2
Rate of braking, m.p.h.p.s	2.25
Number of motors per train	6 or 8
Length of stop, seconds	25
Speed margin	No coast
Train resistance for three 50-ton cars by Blood's formula modified	

cent gain in schedule speed. With longer runs the handicap against the high speed equipment becomes less.

A further study of schedule and balancing speeds is shown graphically in Figs. 2, 3 and 4, which illustrate the possibilities of balancing speeds higher than 60 m.p.h. The relation between length of run, schedule speed and balancing speed is shown by Fig. 2. It is evident that little can be gained by operation with balancing speeds in excess of 60 m.p.h. for runs of a mile or less. When runs are as short as 0.5 mile, there is practically no difference in the schedule speeds which can be maintained.

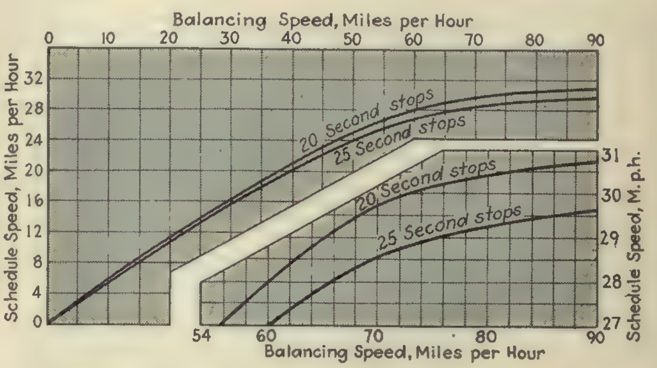
Figs. 3 and 4 represent an analysis of a specific rapid transit service with runs ranging from 0.34 mile to 2.61 miles. The average length of run is 0.926 mile, but schedule speeds are figured on a basis of individual runs. The maximum schedule speed is almost reached with 60 m.p.h. balancing speed, Fig. 3, and there is practically no gain in schedule speed when using balancing speeds in excess of 70 m.p.h. Fig. 4 shows the upper portion of the curve in Fig. 3 on a larger scale.

Table I—Comparison of Rapid Transit Equipments for Two Balancing Speeds

	Balancing Speed 50 M.P.H.		Balancing Speed 60 M.P.H.	
	Local	Express*	Local	Express*
Length of line, miles	10.00	12.00	10.00	12.00
Distance between stops, miles	0.5	1.25 0.50	0.5	1.25 0.50
Daily time of rush service, hours	4	4	4	4
Daily time of average service, hours	20	15	20	15
Headway in rush periods, minutes	2	2	2	2
Headway, average, minutes	6	5½	6	5½
Layover in rush periods, minutes	3	3	3	3
Schedule speed, m.p.h.	18.5	25.1	19.7	27.5
Car weight complete, lb	70,000		72,000	
Average passenger load, lb	8,000		8,000	
Total power per car (two motors), hp	280		380	
Car-miles per year	30,750,000		30,750,000	
Car-hours per year	1,611,000		1,492,000	
Energy consumed per year, kw.-hr	87,000,000		107,000,000	
Cost of platform labor per year, at 40 cents per car-hour	$644,400		$597,000	
Cost of propulsion energy per year, at 1.25 cents per kw.-hr	$1,087,000		$1,337,000	
Total cost, labor and energy, per year	$1,731,400		$1,934,000	
Annual saving in energy and labor for 50 m.p.h. cars	$202,600		....	
Number of cars required, with 5 per cent for rush-hour spares	563		521	
Additional investment in cars for 50 m.p.h. (563 at $35,000 and 521 at $36,400)	$741,000		....	
Additional investment in substations and d.c. distribution system for 60 m.p.h. cars	....		$280,000	
Net additional investment for 50 m.p.h. cars	$461,000		....	
Annual fixed charges and maintenance on additional investment, at 15 per cent	$69,100		....	
Annual increase in cost for energy, labor, fixed charges and maintenance, 60 m.p.h. cars	....		$133,500	

*Express for 10 miles with 1.25-mile station spacing, local for 2 miles with 0.5-mile station spacing.

An analysis of the economics of higher balancing speeds based on typical local and express rapid transit gives the results in Table I. There is a net increase in the annual total costs of energy, labor, fixed charges and maintenance amounting to $133,500 for equipment capable of maintaining 60 m.p.h. balancing speed as compared with the 50 m.p.h. equipment. This increase is entirely due to the traction energy requirements, since there is less expenditure for labor and fixed charges. The analysis illustrates the importance of energy costs in rapid transit service and indicates that runs must be quite long to make efficient use of high balancing speeds.



Figs. 3 and 4—Relation Between Schedule Speed and Balancing Speed, Three-Car Articulated Train

(Fig. 4, lower right, is an enlargement of the upper portion of Fig. 3)

Weight of train, complete, lb	243,000
Weight of passengers, rush-hour load, lb	57,000
Total weight, lb	300,000
Average wheel diameter, in	35
Average volts at train	580
Equivalent grade and curve resistance, lb. per ton	3
Train resistance for three 50-ton cars by Blood's formula modified	
Rate of acceleration, m.p.h.p.s	2
Rate of braking, m.p.h.p.s	2.25
Number of motors per train	6 or 8
Speed margin	No coast
Average length of run, miles	0.926

Balancing speeds based on 600 volts, level tangent track, empty train and train resistance of 40-ton cars.

Higher accelerating and braking rates and weight reduction offer promising possibilities for schedule speed improvements with maximum operating economy, and already have been adopted by trolley car operators. In this connection there also has been a departure from conventional body and truck design in an effort to provide an attractive, economical vehicle.

Similar developments might well be considered for rapid transit. Higher accelerating and braking rates naturally are of less benefit than in frequent-stop city service but a material improvement can be expected for local rapid transit runs. Weight reduction makes a direct saving in the power bill and indirectly contributes to lower car, track and roadway maintenance costs. Body weight can be materially decreased by the use of aluminum alloys, but the most promising possibility is a departure from the conventional design of truck.

The need for higher acceleration has placed the two-motor equipment in the discard for surface cars. Adhesion on all axles is necessary to accelerate rapidly. Rapid transit lines have long used the two-motor equip-

Table II—Comparative Weights and Balancing Speeds, Single and Articulated Cars

Type of Car	Motors Number	Motors Rating, Hp.	Balancing Speed on Level	Weight Complete, Lb.
Single cars				
A—With light-weight body and modern motors..................	2	140	51	70,000
B—With light-weight body, high-speed motors and new-type trucks	4	75	51.5	63,000
Articulated cars				
C—Type now operated, three bodies on four trucks..................	4	210	46.5	208,000
D—With three light-weight bodies and modern motors on four trucks	4	160	48.5	175,000
E—With three light-weight bodies and high-speed motors on four new-type trucks................	8	85	49	152,000

Table III—Speeds and Energy Consumption of Cars of Table II in Local and Express Service

Type of Car	Local Run, 0.5 Mile Schedule Speed, M.P.H.	Local Run, 0.5 Mile Energy, Kw.-Hr. per Car-Mile	Express Run, 1.25 Mile Schedule Speed, M.P.H.	Express Run, 1.25 Mile Energy, Kw.-Hr. per Car-Mile
Single				
A.....................	18.50	3.24	27.00	2.33
B.....................	19.95	3.33	28.50	2.35
Articulated				
C.....................	17.30	8.45	24.80	6.29
D.....................	17.60	7.34	25.20	5.44
E.....................	19.10	7.65	26.90	5.56

ment, which has real advantages with respect to first cost, efficiency and maintenance. However, four smaller motors will improve acceleration and give the space necessary to permit a change from the conventional truck design. The four-motor equipment offers the advantages of better adhesion, higher accelerating rates, reduced truck weight, lower track and roadway maintenance costs and less power cut out per train in case of failure. Higher schedule speeds are possible with little change in equipment operating costs, or the same schedule speed can be maintained with a substantial reduction in the power bill. A change to the four-motor equipment, such as has been made on surface systems, might prove beneficial and should be fully considered for future rapid transit operation.

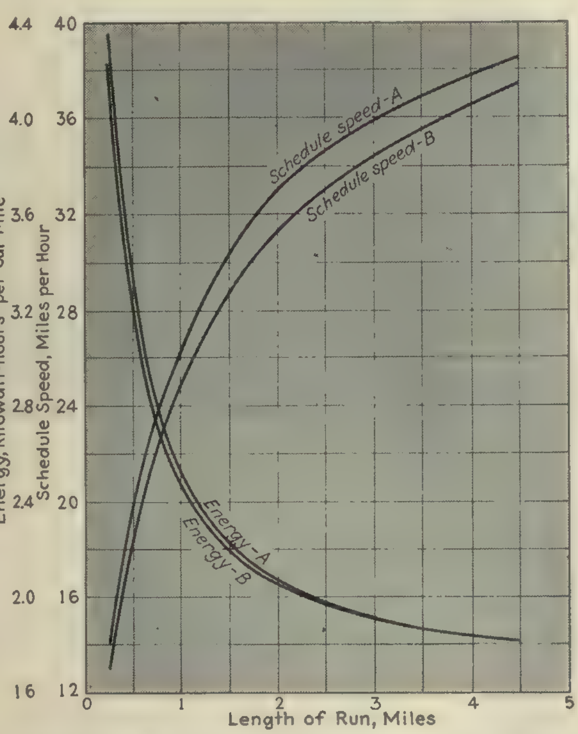


Fig. 5—Relation Between Schedule Speed, Energy Consumption and Length of Run, Single Cars

	Curve A	Curve B
Passenger load, lb........................	8,000	8,000
Average line volts........................	575	575
Grade resistance, lb. per ton................	2	2
Speed margin, per cent.....................	[illegible]	5
Length of stop, seconds.....................	20	20
Motors per car............................	4	2
Horsepower per motor......................	75	140
Weight of car, empty, lb....................	63,000	70,000
Rate of acceleration, m.p.h.p.s...............	2.5	1.75
Rate of braking, m.p.h.p.s..................	2.5	2
Subway train resistance formula used		

A comparison of the weights of single cars and three-car articulated units with large motors and small modern high-speed motors and an improved truck design is given in Table II. It shows the possibilities of weight reduction by this means.

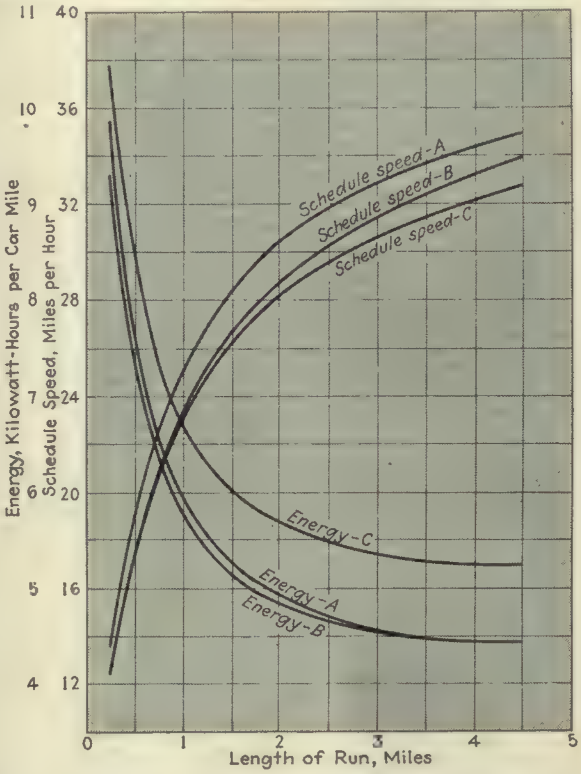


Fig. 6—Relation Between Schedule Speed, Energy Consumption and Length of Run, Articulated Cars (Three Bodies)

	Curve A	Curve B	Curve C
Passenger load, lb................	16,800	16,800	16,800
Average line volts................	550	550	550
Grade resistance, lb. per ton......	5.25	5.25	5.25
Speed margin, per cent...........	5	5	5
Length of stop, seconds..........	20	20	20
Number of motors...............	8	4	4
Rating of each motor, hp.........	85	160	210
Weight of unit, empty, lb.........	152,000	175,000	208,000
Rate of acceleration, m.p.h.p.s....	2.5	1.6	1.6
Rate of braking, m.p.h.p.s........	2.5	1.75	1.75
Subway train resistance formula used			

In making a comparison of standard equipments with those proposed using double the present number of motors per car in rapid transit service, two of the important items of operating costs, power and labor, can be readily determined. The performance of the various equipments is shown by Figs. 5 and 6, which give the relation between length of run, schedule speed and traction energy consumption. The group of curves in Fig. 5 are for single cars, while those in Fig. 6 are for articulated cars. The data give a comparative measure of the results with different accelerating and braking rates, car weights and efficiencies.

The high-speed equipments using double the number of motors per car can make a much better schedule speed with little change in traction energy consumption, regardless of lower motor efficiency and the greater energy requirements of the higher schedule speed. This is due to the saving effected in car weight. The figures for typical local and express runs are given in Table III.

A study of the economic advantages of using lightweight equipment capable of improved schedule speeds has been made. Typical local and express rapid transit service operated with trains of single cars is considered as a basis for the analysis, as given in Table IV.

The data show an annual net saving (labor, power, fixed charges and maintenance on additional investment) of $69,400 in favor of the light-weight equipment using high-speed motors. Labor cost is reduced, energy cost is slightly greater and the fixed charges are decreased due to lower investment required.

Other benefits which will be realized by the use of four-motor equipments on light-weight rapid transit cars are difficult to evaluate and have not been considered. A more complete analysis of the possible economies on the part of operators will provide a comprehensive picture of the results which can be obtained. However, the important items considered indicate the possibilities of developments to reduce car weight in an effort to obtain higher schedule speeds without an increase in operating expenses.

Table IV—Comparison of Standard Two-Motor Equipments with Light-Weight High-Speed Four-Motor Equipments

	Two Standard 140-Hp. Motors per Car		Four High-Speed 75-Hp. Motors per Car	
	Local	Express*	Local	Express*
Length of line, miles	10.00	12.00	10.00	12.00
Distance between stops, miles	0.5	1.25 0.5	0.5	1.25 0.5
Daily time of rush service, hours	4	4	4	4
Daily time of average service, hours	20	15	20	15
Headway in rush periods, minutes	2	2	2	2
Headway, average, minutes	6	5½	6	5½
Layover in rush periods, minutes	3	3	3	3
Schedule speed, m.p.h.	18.45	25.1	19.95	26.65
Car weight complete, lb.	70,000		63,000	
Average passenger load, lb.	8,000		8,000	
Rate of acceleration, m.p.h.p.s.	1.75		2.5	
Rate of braking, m.p.h.p.s.	2.0		2.5	
Balancing speed on tangent track, m.p.h.	51.0		51.5	
Car-miles per year	30,750,000		30,750,000	
Car-hours per year	1,611,000		1,528,000	
Energy consumed per year, kw.-hr.	87,000,000		88,900,000	
Cost of platform labor per year, at 40 cents per car-hour	$644,400		$611,000	
Cost of propulsion energy per year, at 1.25 cents per kw.-hr.	$1,087,000		$1,111,000	
Total cost, labor and energy, per year	$1,731,400		$1,722,000	
Number of cars required, with 5 per cent for rush-hour spares	563		529	
Price per car	$35,000		$36,500	
Total investment in cars	$19,700,000		$19,300,000	
Annual fixed charges and maintenance on cars, at 15 per cent	$2,955,000		$2,895,000	
Annual cost of labor, energy, fixed charges and maintenance	$4,686,400		$4,617,000	

*Express for 10 miles with 1.25-mile station spacing, local for 2 miles with 0.5-mile station spacing.

◆

New Locomotives Facilitate Freight Handling

By Walter Silvus

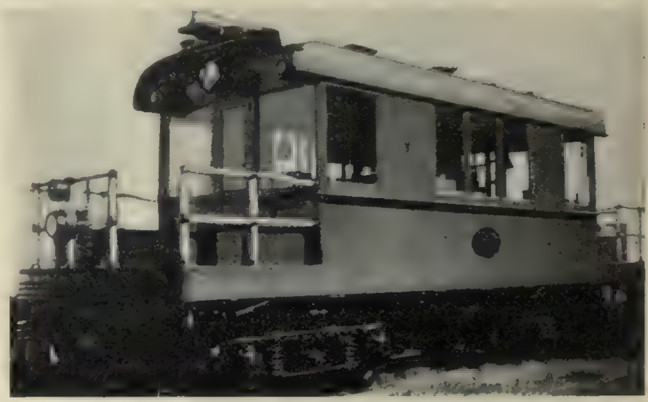
Superintendent of Motive Power Texas Electric Railway, Dallas, Tex.

FREIGHT handling on the Texas Electric Railway has been greatly facilitated by the construction of three electric locomotives which have been designed and built by the company at its Monroe shops. The last one has recently been completed and put in service on the 76-mile Dallas-Denison division. It is planned to build two additional units this year, one for the Dallas-Denison division and one for the Dallas-Corsicana division, to take care of the increasing freight business.

Each locomotive weighs 50 tons and is 34 ft. over bumpers. The cab is 19 ft. long, the width over sheathing 9 ft., and the height from rail to top of trolley base 14 ft. 2 in. Two swiveling trucks are used, spaced at 17 ft. 10 in. centers.

The longitudinal body members consist of four 10-in., 30-lb. I-beams and two 10-in., 25.3-lb. channels, supported by body bolsters of 1¼x12-in. soft steel plates with steel fillers. The bumpers are 1¼x10-in. soft steel secured to longitudinal members, with angles securely riveted, and with anti-climbers riveted to the outside faces. Both underframes and cab are securely tied and braced to stand the hardest kind of service. The body corner posts are made of 3x3-in. angles, the intermediate posts and carlins of 3x3-in. tees and the side and end plates of 3x3½-in. angles.

The roof and side sheets are 12 gage sheet steel riveted to posts and carlins. The metal roof is covered with felt roofing paper, cemented to prevent slipping, and this in turn is covered with No. 8 duck, held by 1¼-in. half-oval steel beads at the sides. Large windows in the front and sliding windows in the sides give a good view in all directions. The front sash has waterproof ventilators and hand-operated window wipers.



Three of these new 50-ton locomotives are being used for handling freight on the Texas Electric Railway

The unit illustrated is mounted on Brill 27-MCB-3X trucks with 5x9-in. journals, and is powered by four GE-73-C motors. The controllers are Type K-64-D with LB-977 line switches and a DH-124 commutating switch for placing all four motors in series. The air brakes are Westinghouse 14-EL supplied by two CP-28 air compressors suspended beneath the floor. All other equipment is within the cab and protected by wire screens. Ohio Brass Company Form 23 couplers are used. The lowest possible gear ratio was employed, the speed with all four motors in parallel being 20 m.p.h.

One circuit of lamps is located under the frame, one lamp being at each corner and one near the air compressors. One Golden Glow and one GE-D-15 headlamp is used at each end. Shop-made electric markers display white, red or green lights. Illuminated metal train number boxes are located at each end.

Flexible Progressive Signal System Aids Traffic Movement *in Downtown Pittsburgh*

By J. R. Stauffer
Assistant Editor *Electric Railway Journal*

with co-operation of

Burton W. Marsh
Traffic Engineer in Charge of Bureau of Traffic Planning, City of Pittsburgh

Signal lights in downtown Pittsburgh are prominently located on all four corners of an intersection

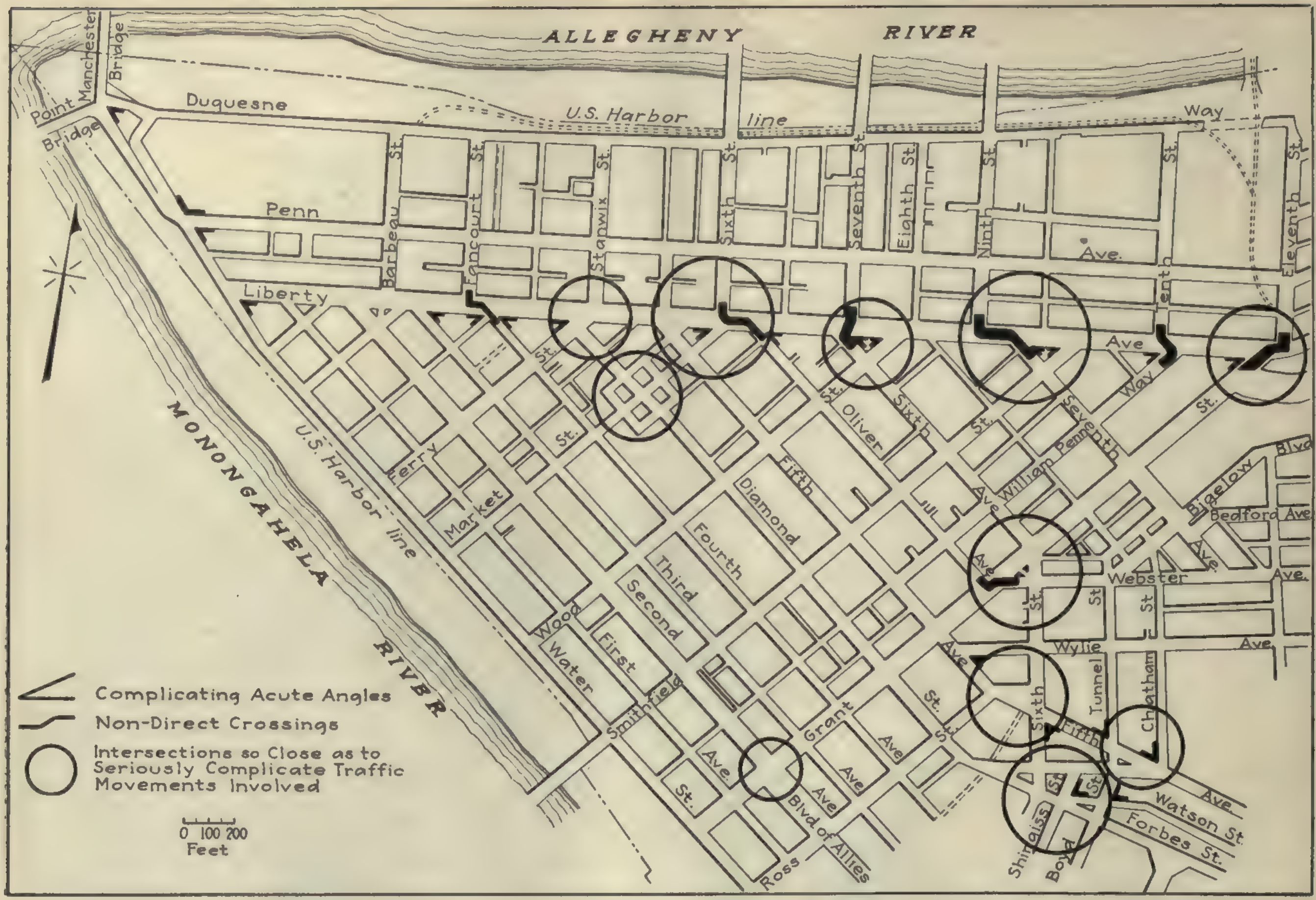
IMMEDIATE improvement in every phase of traffic movement followed the installation of an automatic flexible progressive system of signal lights in downtown Pittsburgh. Vehicular speeds in heavy hours increased at once, and as automobile drivers and street car operators become more thoroughly accustomed to the system, and as other traffic improvements are made, further increases in speed will be possible. More than 20 per cent greater volume of traffic is now moving at a speed 22 per cent faster than was possible before electrical control was put in operation on June 12, 1929.

From the standpoint of the railway company, street car operation in the downtown area has benefited particularly because of the regularity with which cars can now negotiate the various loops. Street car speeds have increased between 5 and 10 per cent on these loops. Although the speeds of street car movement for which the street car co-ordination was designed have not yet been achieved, improvement is being made as the operators become more familiar with the signals.

The equipment for the signal system was specified from the findings of an extensive engineering survey of traffic conditions covering a period of 1½ years. For ten months careful studies were made of the signal systems and traffic control methods in a number of other cities in the country, and the remaining eight months were devoted to an intensive study of traffic conditions in the central business district of Pittsburgh and to the securing of basic data necessary for scientific co-ordination and timing of signals. The thoroughness of this survey was a primary factor in the excellent results which have been obtained during the past ten months. Since the signal system has been in operation, only a few minor changes in co-ordination and timing have been necessary.

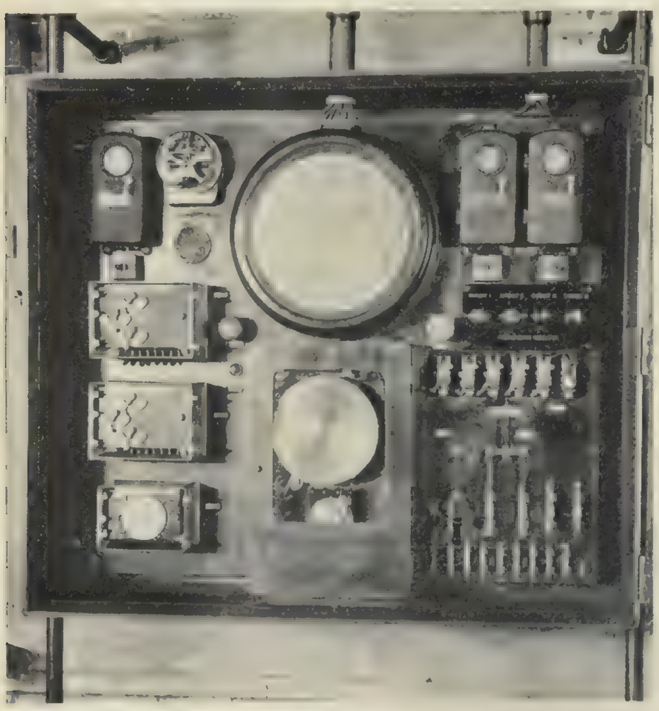
The type of signal control decided upon was the flexible progressive system. This system has many advantages over the other types. In fact, no other available system would have proved at all satisfactory in downtown Pittsburgh with its complex and irregular street layout, its varying but generally short block lengths, and its widely varying traffic demands on different streets. The flexible progres-

More vehicles being moved at greater speed. Railway speed also increased but major benefit is regularity. District pedestrian advantages. Complete design of specifications for flexible progressive signal system developed by an extensive survey



Pittsburgh's complex and irregular street layout demanded the most flexible system of electrical traffic control

sive system permits starting the main street "Go" interval at each intersection at just that part of the cycle when it will provide the best progressive movement. Furthermore, practically any desired percentages of the total cycle may be assigned to the two streets—and this cycle split may be varied with changing traffic requirements. The cycle length may be automatically varied—for example, made short to permit faster movement in light traffic hours, and longer to take account of the slower movement of peak-hour traffic. Also, once during each cycle, an automatic check-up insures that signals at all intersections are properly in step. These somewhat technical points are mentioned to emphasize the great degree of flexibility which this system embodies. These elements of flexibility are valuable tools to work with in achieving a maximum of efficiency. With the many complications encountered in downtown Pittsburgh, the lack of any of these tools would mean a most serious handicap in getting the best possible results.



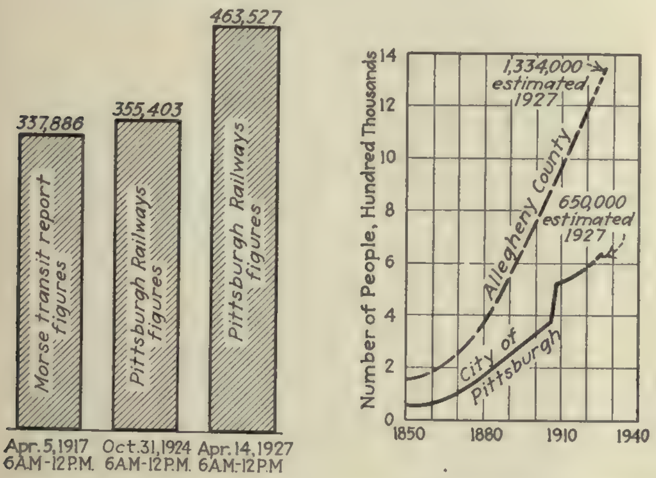
The master control panel is located in the basement of the City-County Building

Brief Description of Equipment Used

The electrical equipment of this system, designed and constructed by the General Electric Company, consists of a master controller, local controllers at each intersection, with necessary interconnecting cable and the actual signal lights with their mountings. The master controller may best be described as a transmitter of electrical impulses, and the local controllers as receivers of such. The lights at any one intersection are operated by the local controller at that intersection, but the electrical impulses which actuate and govern the speed of the local controller are sent out by the master controller located in the City-County Building on Grant Street.

These impulses are not to be confused with the electric current actually used by the signal lights. This current is supplied locally at each intersection direct to the lights from the lines of the Duquesne Light Company.

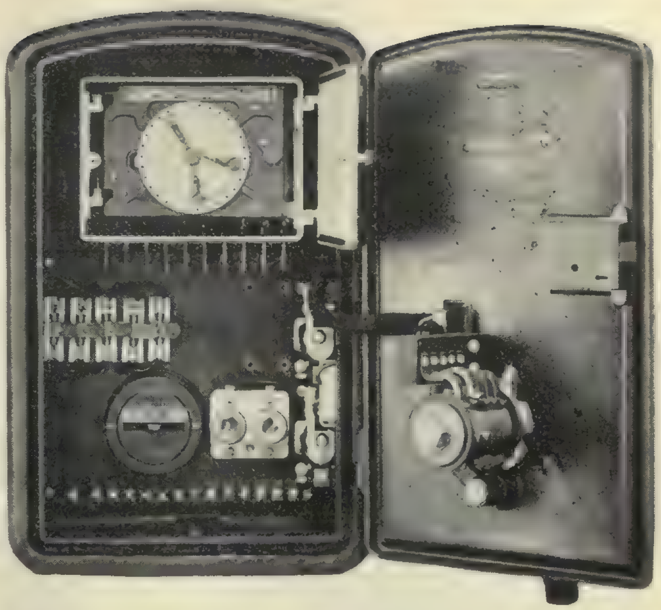
The master control equipment mounted on a single panel in the basement of the City-County Building, consists primarily of a master impulse transmitter, automatic throw-over, secondary (or spare) master impulse transmitter, program clock governing cycle length changes automatically, trouble detectors, reset switch, a time clock to turn the system on in the morning and off at night, and sign circuit time clocks. The master controller consists of a simple induction disk type motor with three actuating coils, each of which causes the disk to operate at a different speed. Only one of these coils is driving the disk at one time. Each is set to rotate the disk at such a speed as to set up a specific cycle length for the system. For this particular system, one coil controls a cycle of 48 seconds, another of 50 seconds, and a third a cycle of 52 seconds. Changes from one coil to another are controlled by the program clock. If desired, any one of the coils may, by a simple lever movement, be made to produce a different cycle length. The duplicate, or spare, master impulse transmitter is put into service almost instantly by an automatic throw-over in case the regular impulse transmitter develops trouble.



Increase in street car riders, shown at left, and population growth, at right, were important factors in survey studies

When the secondary master impulse transmitter is put into service, a red lamp lights on the board to show the attendant that the primary master transmitter is out of order. As a matter of fact, the spare transmitter has not been brought into operation because of trouble except in a very few instances. Nevertheless, the spare is a valuable safeguard.

Impulses sent out by the master transmitter are transmitted through four sets of relays, each controlling a section of the central business district. Although the system as a whole is operated as one unit from the master controller, the four divisions are made for aiding in the location of trouble and for emergency operation of only certain sections. In case of a fire, a parade, or any trouble in one section of the city, that district alone can be cut out of operation and the remaining three sections will continue to operate normally.



A local controller is installed at each intersection and operates all lights at that point

Program Clock—One of the most interesting, as well as important, automatic features of the central control is the program clock. This clock consists of a series of disks calibrated for the time of day for each day of the week. On these wheels the cycle changes are set for each particular day. After the settings are all determined and made on this clock, the entire system of lights functions at its direction, the changes in cycle being made automatically. It is this clock which changes the operation from one coil to another on the master transmitter. If any further changes in cycles are desired at any time, they can be made manually by a resetting governing the particular coil then actuating the transmitter.

The program clock for normal operation in Pittsburgh at the present time is set for cycle changes as follows:

Monday, Tuesday, Wednesday, Thursday, Friday
8:00 a.m. to 8:45 a.m.—50 seconds
8:45 a.m. to 9:15 a.m.—52 seconds
9:15 a.m. to 11:45 a.m.—48 seconds
11:45 a.m. to 1:30 p.m.—52 seconds
1:30 p.m. to 4:00 p.m.—48 seconds
4:00 p.m. to 6:10 p.m.—52 seconds
6:10 p.m. to 8:00 p.m.—48 seconds
8:00 p.m. to 8:45 p.m.—50 seconds
8:45 p.m. to 10:30 p.m.—48 seconds
10:30 p.m. to 11:15 p.m.—50 seconds
11:15 p.m .to 12:00 midnight—48 seconds
Saturday: Same as weekday until 4 p.m.

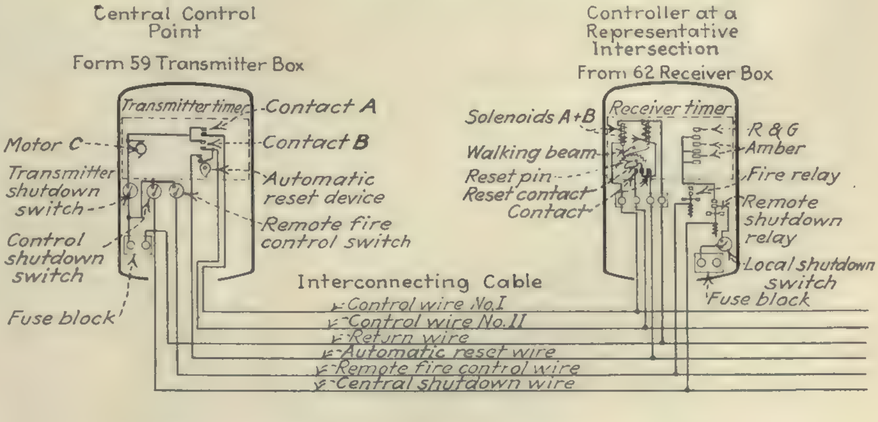
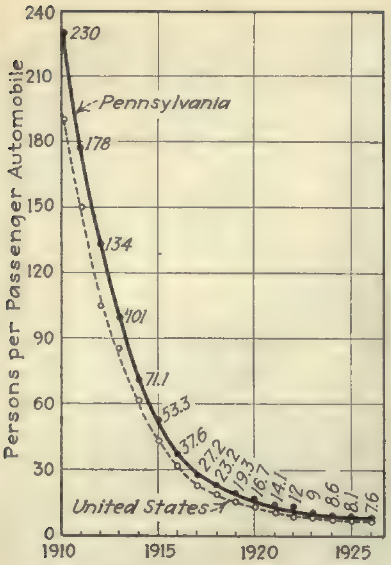
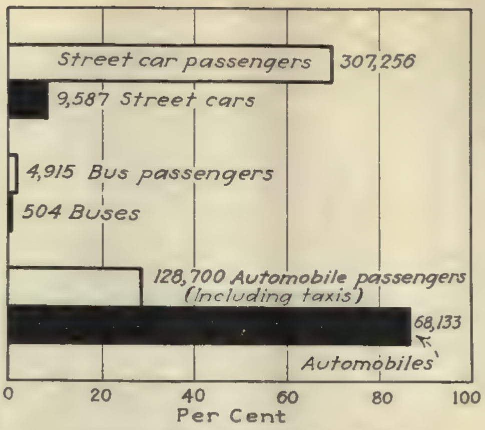


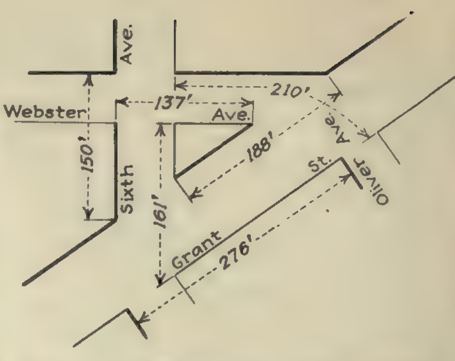
Diagram of wiring between master and local controllers



Increase in automobiles per capita



Relative efficiency of street vehicles



Typical complicated street intersection in downtown Pittsburgh

4:00 p.m. to 8:45 p.m.—52 seconds
8:45 p.m. to 11:15 p.m.—50 seconds
11:15 p.m. to 12 midnignt—48 seconds
Sunday: 48 seconds from 9 a.m. to 11:30 p.m.

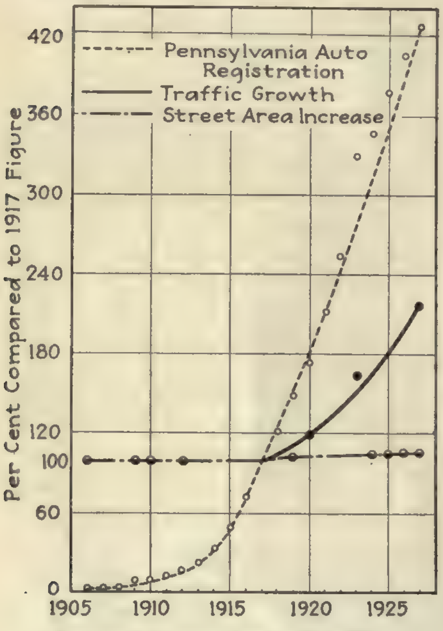
On holidays a 50-second cycle is used all day. Greater variations in cycle length would be used were it not for the several complicated intersection groups which limit the permissible changes. Somewhat wider variations are now being tried out.

Trouble Detectors—On the master control board four trouble detectors in the form of small neon bulbs indicate when one or more local controllers in that section are out of step. Normally, when there is no trouble, each of these four neon bulbs flickers dimly with each impulse sent out, thus giving a positive signal that all is well. If one of these bulbs glows brightly, it is an indication of trouble in the corresponding section of the system. In case one of these neon lights goes out completely, the attendant knows that there is fuse trouble on the control board, and that the resynchronizing circuit is not operating properly.

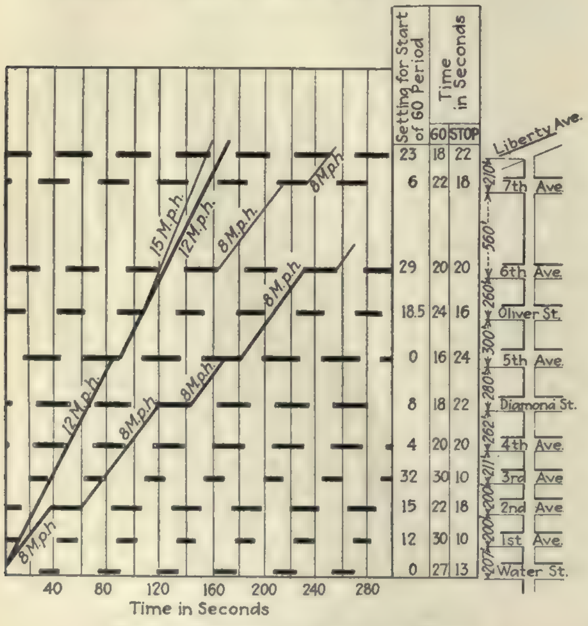
Automatic Reset—This system also makes it possible to shift from one co-ordination arrangement to a second by merely throwing a switch. This is done through automatic reset apparatus. The automatic reset consists of a switch on the master control board which energizes a relay in all the local controllers at once. When the local reset relays are energized, changes in the relative start of the main green period, according to a predetermined set-up, are quickly and automatically effected. This secondary co-ordination affords the opportunity to set up a more advantageous co-ordination for the outward surge of traffic in the evening peak hours. This outbound surge, on some streets in particular, is such that a co-ordination considerably different from normal will bring greater efficiency in traffic movement throughout the system. While this secondary co-ordination has not as yet been generally used over the entire system, tests have been made on one of the main "free-wheel" arteries with satisfactory results. Further application of this reset co-ordination is being studied.

Control of Illuminated Signs—Two sign circuit time clocks complete the main equipment on the master control panel. These clocks will automatically control the operation of illuminated traffic signs which will be used throughout the central business district. These signs will indicate one-way streets, points at which left turns are not permitted, etc., and will be located on the signal light post directly under the signals themselves. These signs will be very prominent in this position because they will be at the point where all motorists' attention will be directed as they approach an intersection. One unique feature of certain of these signs—mainly those prohibiting left turns—is that when the sign is illuminated, the turn prohibition

The diagrams reproduced on this page are indicative of the thoroughness with which the many traffic studies were made



Increase in street area and traffic



Timing diagram for Smithfield Street

will secure the attention of drivers, whereas when the regulation is no longer in effect a time clock will automatically cause the sign light to go out and the sign face will appear blank. Certain other signs, such as one-way street signs, will be illuminated and effective at all times.

Local Controllers—The mechanism known as the local controller, which actually governs the signal lights for an intersection, is placed on an existing pole or on a special signal post at each intersection. It consists essentially of two solenoids, alternately receiving impulses from the master transmitter, and operating a "walking beam" which rotates a toothed wheel at a controlled speed that determines the cycle length. On the face of this wheel are adjustable lever arms which, through cams, cause the various light changes at times selected to fit traffic requirements at that intersection. These times are adjustable on all lights, although the total length of cycle is constant at all intersections. Because of the simplicity and sturdiness of the local controller, relatively little trouble has arisen since their installation. The controllers are "jack mounted" so that they may be easily replaced in case of trouble. This feature also makes possible removal for periodical shop adjustment and oiling with a minimum interruption to signal operation at the intersection in question.

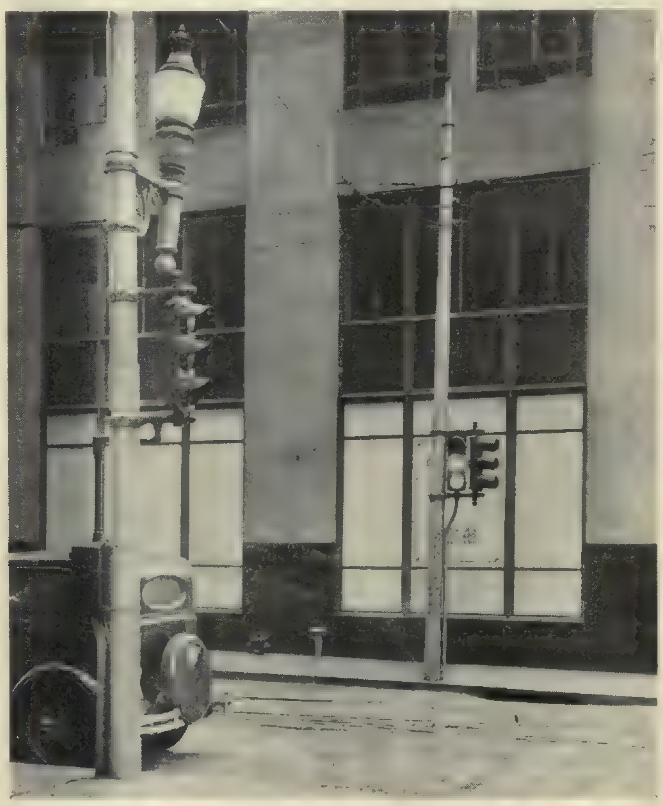
Modes of Transportation Used by Patrons and Employees of 48 Selected Stores in Entering the Central Business District, April 14, 1927

	Patrons		Employees		Total	
Mode	Number	Per Cent	Number	Per Cent	Number	Per Cent
Street car	39,477	62.5	6,435	70.3	45,912	63.6
Automobile	8,910	14.1	710	7.8	9,620	13.3
Train	7,677	12.1	1,309	14.3	8,986	12.4
Walk	4,465	7.1	558	6.1	5,023	7.0
Motor coach	2,552	4.1	140	1.5	2,692	3.7
Totals	63,081	100.0	9,152	100.0	72,233	100.0
COMPARISON BETWEEN CERTAIN MODES OF TRANSPORTATION						
Mass Transportation Units	49,706	84.8	7,884	91.7	57,590	85.7
Passenger auto	8,910	15.2	710	8.3	9,620	14.3
Totals	58,616	100.0	8,594	100.0	67,210	100.0
Pedestrians	4,465	8.0	558	7.1	5,023	7.7
Street-using vehicles	50,939	92.0	7,285	92.9	58,224	92.3
Totals	55,404	100.0	7,843	100.0	63,247	100.0
Street-using vehicles	50,939	86.9	7,285	84.8	58,224	86.6
Off-street vehicles	7,677	13.1	1,309	15.2	8,986	13.4
Totals	58,616	100.0	8,594	100.0	67,210	100.0

THE PITTSBURGH CYCLE

The Pittsburgh cycle differs from that recommended in the Hoover model municipal traffic ordinance in that there is a short yellow period of about two to three seconds following the red light. The main reason that the Hoover committee recommended eliminating the yellow after the red was that experience had shown that, with conditions as they then existed, many vehicle drivers tended to start on the yellow, instead of waiting for their green light. However, it is believed that this trouble, to a considerable extent, grew out of an attempt to use the yellow light for many different purposes, and out of the wide variations in length of yellow which existed in different communities. The yellow light was used as a cautionary signal, as a full stop signal, as a left turning signal, and as an exclusively pedestrian period. From a construction point of view, it was also simpler and less expensive to make the yellow following the green and the yellow following the red of the same length. Hence, the red light was often followed by a long yellow period, the need for which the public could not understand. Under different uses, the length of the yellow interval varied from a second or two, to more than fifteen seconds. So much experimentation was going on concerning its use that the public became disgusted with it, and there was a strong tendency to disregard it.

In the Pittsburgh cycle, a two to three-second yellow following the red is retained. This gives an opportunity for street car operators to shut their doors, release the air pressure on the brakes and prepare to start. It also enables vehicle drivers to get into gear ready to start. In answer to the criticism that even under a short yellow there would be a certain amount of starting before the green light showed, it is certain that the short yellow reduces both the probability and the seriousness of this violation.



Double series of lights mounted on a single arm present a neat appearance

The now generally recognized function of the yellow light following the green is to act as an intersection-clearance interval. Both vehicles and pedestrians should be given a proper opportunity to clear the intersection before cross traffic starts. The time required for the average vehicle to clear the intersection of two four-lane streets, at the relatively slow downtown speeds, is about two to three seconds. On the other hand, the time required for the average pedestrian to clear the same intersection is about nine to ten seconds. If an intersection-clearance period of two to three seconds is used, a pedestrian starting at the last second of the green light would find himself about one-third across the roadway when cross traffic starts. Such a situation is obviously unfair to pedestrians. If, on the other hand, the intersection-clearance period is made nine to ten seconds long, to give sufficient time for pedestrians to clear an intersection, and if vehicles must stop during that longer period, a serious penalty is imposed upon vehicular traffic, especially with short signal cycle lengths.

The Pittsburgh cycle gives the pedestrian the necessary clearance interval without penalizing vehicular movement. This is accomplished by informing the pedestrian of that instant during the green period when there is no longer time for him to walk across the street before cross traffic starts. The method of accomplishment is by bringing the yellow light on with the green, nine or ten seconds before the cross street gets its "Go" signal. This green and yellow combination continues for approximately seven seconds. The green light then disappears and the yellow light alone shows for two to three seconds—and then the cross street gets its "Go" signal. In use, the cycle is simpler than it sounds. Pedestrians walk only on the green when shown alone. Vehicles, on the other hand, move on the green-alone signal, and may continue to move on the green-yellow. The green-yellow interval, plus the yellow-alone interval, gives the pedestrian clearance time. The yellow-alone is the vehicle clearance interval.

Location of Signal Lights

In practically every case, signal lights are located on the far right-hand corners of an intersection. In a number of cases where pedestrian traffic is heavy, two sets of lights are mounted on one pole. In a few cases, auxiliary nearside lights are installed where signals at the far side may not be clearly visible to the approaching vehicle driver. At three points in the downtown section, where the street layout is complicated and does not lend itself to curb-mounted signals, pedestals located in the streets are used.

The preliminary survey considered having the Duquesne Light Company furnish all the equipment, making a rental charge per signal to the city. However, it was decided to be of greater advantage to have the city furnish the signals and control equipment and the Duquesne Light Company furnish all power, cables and connections. There was general agreement that the city should have direct control over the signals and control equipment, thus enabling the city to take advantage of improvements in design which might come with the passage of time without the necessity of negotiating with the power company.

Cost of the System

The cost of the complete installation was approximately $237,000. Equipment cost amounted to $70,000; engineering and personnel $21,000; new poles and relocation of old ones, $10,500; underground work, cables, conduit, labor, etc., $136,000. The cost per intersection was about $2,500.

Designing an electrical traffic control system for a district such as downtown Pittsburgh necessitated a very complete engineering study of street use and of all the factors having an influence upon the volume, speed, character and distribution of vehicles and pedestrians on the street. An extensive survey authorized by the Mayor and Council which covered a period of 1½ years was made under the general supervision of the Better Traffic Committee of the City of Pittsburgh. The survey subcommittee was under the chairmanship of John M. Rice, consulting engineer. A special survey staff, assisted by the Bureau of Traffic Planning, gathered and analyzed the facts, and prepared recommendations. Traffic Engineer Burton W. Marsh was director of the survey, and Prof. Lewis W. McIntyre, street traffic specialist, University of Pittsburgh, acted as technical adviser.

Among the investigations undertaken by the survey were the following: A complete study of the traffic volume, classified according to type of vehicle and direction, including turning movement at all downtown intersections; a count of all persons entering and leaving the downtown district, including the means by which they were transported; a study of the means used by patrons and employees of a selected group of 48 stores to reach the downtown district; a study of the vehicles parking and loading on the streets, as well as the use of parking garages and private parking lots. The survey gathered accurate statistics on the hourly variation of vehicular and pedestrian traffic flow at selected intersections, including the determination of the peak period. It made a study of the daily variation of vehicular flow at a selected group of intersections as well as seasonal variations; a stop-watch study of the characteristics of vehicular flow at a selected group of intersections by ten-second periods, including an analysis of the turning movement, number of pedestrians crossing against the signals, etc.; a study of the length and effectiveness of "Go" periods used by officers in regulating traffic at a large number of intersections.

In studying the different streets and analyzing traffic conditions, the survey took into account the fact that in every street there is a critical or determining lane which by virtue of its use decides how long the "Go" interval on that street should be in relation to the "Go" interval on the intersecting street. In the Pittsburgh survey unit time figures were used for the different types of movements which took place in the lane, such as street cars or automobiles going straight through, turning left or right, etc. "Go" periods, based on time demands of the critical lanes on the two streets, were determined by the average composition of traffic in the critical lane and the unit times required for the vehicle and street car movements in those lanes. Further studies were made of the delays caused by various types of left turns of various types of vehicles at different intersections. Speeds of street car movements and loading times on all of the downtown streets, as well as the delays were studied. Data on the unit time necessary for street cars and motor vehicles of various types to clear intersections were taken to aid in determining the time necessary for composite groups to clear intersections. Streets themselves were studied with respect to storage or reservoir capacity, block lengths, traffic capacity and the like.

Analyses of some of these studies brought forth some interesting street car data. They showed that the street car in Pittsburgh carried an average of 32 passengers per car, while the passenger automobile carried in downtown Pittsburgh only 1.89 passengers per car. Other studies showed that the street car required about three times as long to clear an intersection as a passenger automobile. Therefore, even considering that in the space occupied by a street car about two passenger automobiles could be moving, from the standpoint of street capacity only, the street car was shown to be several times as efficient as the automobile in furnishing transportation to the public.

Interesting data on the conditions which led to the installation of traffic control in Pittsburgh as well as facts derived from the survey are shown graphically in accompanying charts. There are also illustrations of the master panelboard and of signal mountings on existing trolley poles. Signal equipment installed on poles or posts especially for that purpose, present a very pleasing appearance.

Operation of thirteen new cars of this type was begun on March 30 by the Youngstown Municipal Railway

Speedy, Light-Weight Cars

Placed in Service in Youngstown

Latest type vehicle of Municipal Railway seats 45 passengers and weighs only 28,800 lb. High-speed, 300-volt motors used with WN drive and 22-in. wheels. Brakes and control are foot-operated

By

R. N. GRAHAM

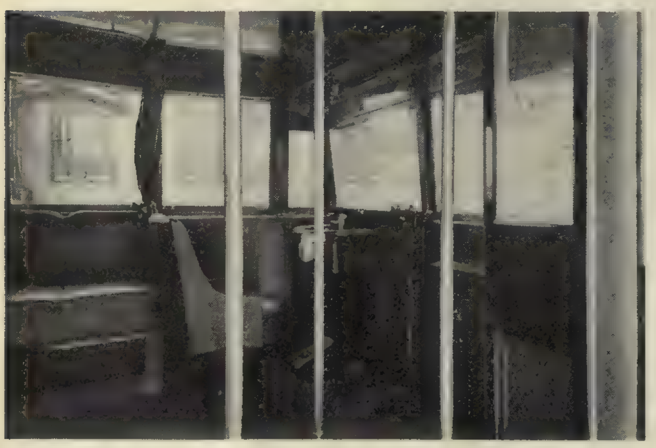
Manager Youngstown Municipal Railway

NUMEROUS departures from conventional practice are embodied in the design of a group of thirteen new cars just placed in service by the Youngstown Municipal Railway. They were built by the G. C. Kuhlman Car Company. Although the new car seats 45 passengers comfortably, it weighs only 28,800 lb. This low weight has been secured by the elimination of all doors except one at each end, the extensive use of aluminum in the framing and fittings, and the use of small, high-speed motors. Rapid acceleration is made possible by the relatively large amount of power available in proportion to the weight, and by automatic control. Both control and brakes are foot operated. Even during the short period these cars have been in service they have become very popular with the public.

The rate of acceleration of the new cars has been found by actual measurement to be $3\frac{1}{2}$ m.p.h.p.s. This is accomplished with a setting of the circuit breakers fully protecting the motors. The control is of the General Electric Type PCM. Fast, smooth acceleration is attained by increasing the number of resistance steps so that each increment of accelerating current is small, and at the same time cutting the resistances out of the motor circuit more rapidly than is feasible with the customary K controller.

On the main controller are nine series and nine parallel notches. Its action is automatic. The master controller is foot-operated and has three positions. The first position gives a slow speed, the second full series, and the third full parallel. Normally the operator presses the pedal down to full parallel position and the control

Accommodations are provided for 45 passengers on comfortable leather upholstered seats



Brakes and controller are operated by pedals. The reverser is in a cabinet at the left of the operator's seat, while the door control is immediately in front of him. The fare box, not shown in this view, hangs on the stanchion at his right

notches up under the direction of an accelerating relay. If he desires to hold the control on any resistance notch it is done by a simple manipulation of the pedal.

Line breaker, contactors and motor resistors are located under the car, while the reverser, which includes contacts for emergency electric braking, is inside near the operator so that in case of an air brake failure it can be operated directly by hand and stop the car with dynamic electric braking. The foot controller includes a pilot valve operated by the heel plate which provides the customary dead-man's features usual with one-man operation.

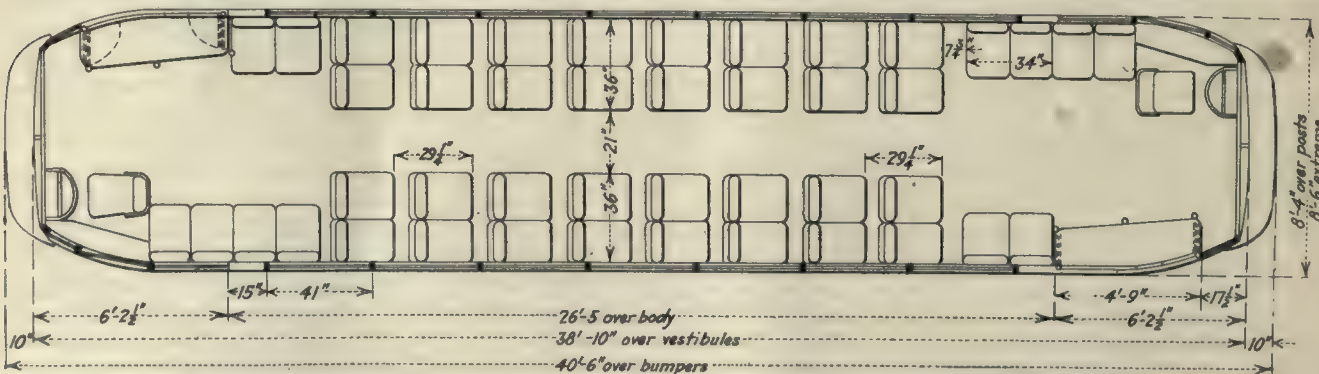
Of particular interest is the mounting of the motors and the WN drive. Brill trucks are used with certain modifications to care for this drive. The gear ratio is 7.21 to 1. A special support carries one-half of the motor weight while the other half of the motor weight and half of the gear unit weight are held by clevis castings supported by the transom. Positively-centered thermoid disk couplings are used and the link between the gear unit and the clevis casting has a ball and socket joint at each end, permitting freedom of motion in any direction to take care of the movement of the car axle. Transverse leaf springs and coil journal box springs contribute to the riding qualities of the car. The brake hangers are so constructed that noise is prevented even when the parts become worn.

This design of motors and drive has been effective in several ways in meeting the requirements of the Youngstown Municipal Railway. Chief among these is weight reduction. By utilizing a high-speed motor wound for 300 volts, high temperature insulation and a double reduction drive, sufficient clearance was obtained to permit the use of 22-in. wheels. The resulting economies in weight brought the total car weight down to 28,800 lb. or approximately 2,100 lb. less than the corresponding standard axle-hung motor, truck and 26-in. wheels.

To assure safety under all conditions, even in case of failure of air, the control being pneumatic, the reverser has been so designed that it functions through electrical

Details of New Youngstown Cars

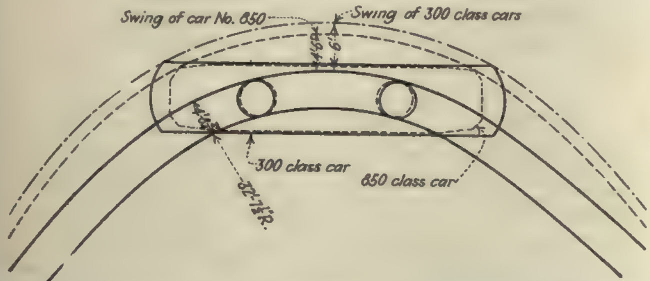
Weight	28,800 lb.
Bolster centers	17 ft. 0 in.
Length over all	40 ft. 6 in.
Length over body posts	26 ft. 5 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 5¼ in.
Height, rail to trolley base	10 ft. 2¾ in.
Window post spacing	41 in.
Body	Semi-steel and aluminum
Roof	Arch
Doors	End
Air brakes	Westinghouse, foot control
Axles	Brill
Car signal system	Consolidated
Compressors	Gen. Elec. C-27-B
Conduit	Duratube
Control	Gen. Elec. PCM
Destination signs	Hunter
Door mechanism	National Pneumatic
Doors	Folding
Fare boxes	Cleveland
Finish	Duco
Floor covering	Tuco
Gears and pinions	Westinghouse-Nuttall
Glass	Non-shatterable
Hand brakes	Peacock
Heat insulating material	Celotex
Heaters	Railway Utility
Headlights	Ohio Brass
Headlining	Haskelite
Interior trim	Mahogany—steel frieze and moldings
Journal bearings	Plain, 3½ x 6
Journal boxes	Brill
Lamp fixtures	Elec. Service Supplies
Motors	Westinghouse No. 1425A
Painting scheme	Tan and cream
Roof material	Wood and canvas
Sash fixtures	O. M. Edwards
Seats	Brill 210-C
Seat spacing	29½ in.
Seating material	Leather
Steps	Stationary
Step treads	Kass
Trolley catchers	Ohio Brass
Trolley base	Ohio Brass
Trolley wheels	Ohio Brass
Trucks	Brill 177-E-1-X
Ventilators	Brill
Wheels	Naco, 22 in. diameter
Fenders	Eclipse NB



Plan and principal dimensions of new Youngstown car built by The G. C. Kuhlman Car Co.

connections instead of through air. The reverser handle is located on a panel convenient to the operator; when turned to the left it exercises its usual function of reversing the motors, but when the handle is turned to the right the motors act as a dynamic brake, providing a positive retardation for the car under any circumstances, even though air is gone and there is no power.

Braking on these cars is unusually effective. In tests, retardation as rapid as 6 m.p.h.p.s. has been realized. These brakes are equipped with automatic retardation control furnished by the Westinghouse Traction Brake Company, which also has supplied the entire braking apparatus with the exception of compressors, which are made by the General Electric Company. When the brake pedal is depressed the sudden retardation of the car automatically actuates a lever which cuts off the air, this process being continued until the car is brought to an easy stop.



Comparison of car swing of new cars of Youngstown Municipal Railway and cars of approximately the same capacity of an older type

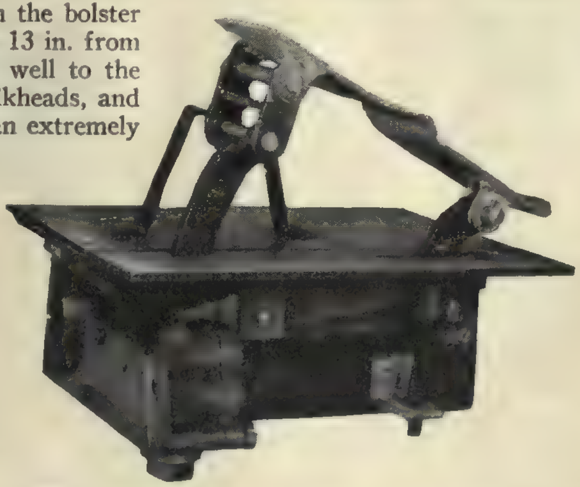
Use of the 22-in. wheels makes possible a very low floor. However, there is a 3-in. ramp from the bolster graduated to the well step. The first step is 13 in. from the ground to the well; the step from the well to the floor of the car is 12 in. There are no bulkheads, and with the platforms on the same floor level, an extremely rigid framing for the entire floor is provided. The floor is Flexolith without trapdoors or openings of any kind. Aluminum is used freely in the framing of the car for the strength members where there are no severe stresses. Aluminum sheets are used on the exterior of the car instead of steel. It is also used on all interior fittings including metallic parts of seats.

A door-opening valve located convenient to the operator has separate positions for the front leaf of the door, the back leaf of the door, and for both doors. At the bottom of the left front sash in front of the operator a sash heater is installed to prevent frost from collecting on the window, either outside or inside. This is the standard practice of the railway. The heater has been especially designed for the purpose and bears the approval of the Underwriters' Laboratory. Above the front sash are two ventilators. The opening of these ventilators speedily changes the air in the car.

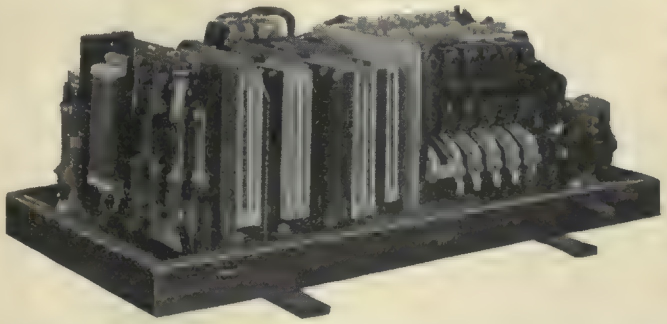
The height of the first step is 13 in. and the second is 12 in. The ramp is 3 in.

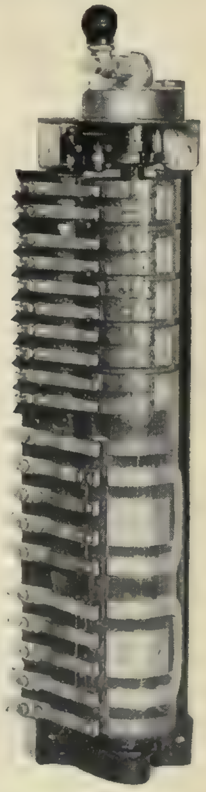
No apparatus or paneling is visible at the front of the car with the exception of the one vestibule heater, the door-opening valve, the air gage and the emergency brake. All switches for the car operation are paneled in at the side of the operator where he has easy access to them.

The operator's seat is Brill bucket type No. 1006 and can be moved up or down, backward or forward. When the operator changes ends, the seat can be turned in a firmly fixed position to be used by a passenger. Illuminating the inspection plate of the fare box is made possible by a small aluminum-covered light located on the fare box stanchion. The passenger seats are of the deep spring type upholstered in leather.



General Electric type C-523-A foot control, weighing only 38 lb., is used on the new Youngstown cars





Main control switch group weighing 447 lb. is placed under the floor of the car. Covers are removed in this view. At right—The reverser switch, weighs 42 lb. It is housed in a cabinet at the left of the operator

Illumination is furnished by a double row of dome lights. In conformity with standard on the Youngstown property, twenty lights are in series, using 32-volt gas-filled Mazda lamps short circuiting and with short circuiting sockets. Side destination signs are placed in the roof letterboard. Destination signs in front and rear are of extraordinary size, providing visibility for many blocks. The headlight is equipped with louvers, illuminating the entire dash, thus outlining the front end of the car. This is done instead of using two headlights, as the use of two headlights tends to confuse the user of the street into thinking that the vehicle is a bus instead of a car and thus is a vehicle that can turn from its indicated course. There is a visor extending around the entire front sash to keep ice and snow off the window.

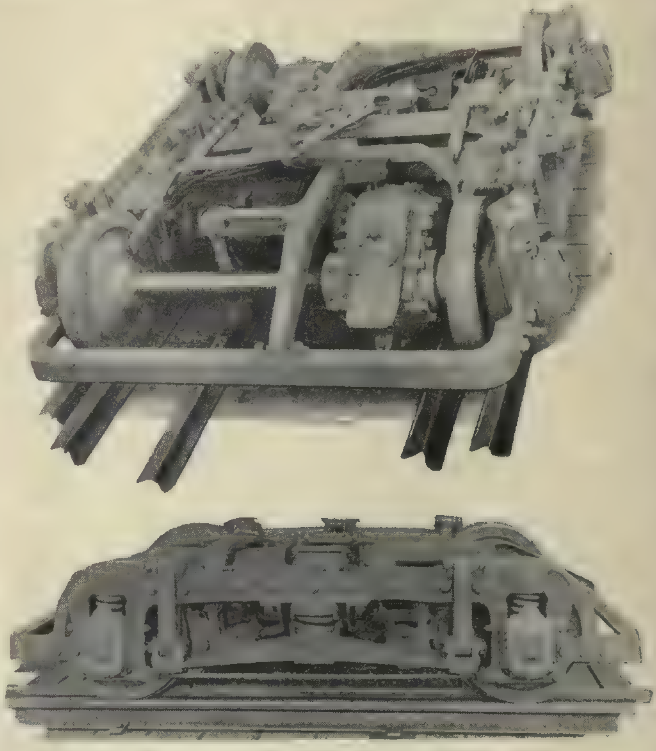
Heretofore it has been usual to install door engines over folding doors, with a door to give access to the equipment. This door is likely to rattle and is usually unsightly. In the Youngstown cars the sign molding is continued over the door engines, and slots are provided by which the door engine can be reached and adjusted through the sign molding.

At the rear end of the car the operator's seat is swung around and made available for passenger use

These new cars are being operated on the most important route in the system, a double-track line extending from one of the largest plants of the Youngstown Sheet & Tube Company on the northwestern city limits through the southeastern city limits to another large plant of the same company at Campbell. This route runs for three-quarters of a mile on the main street through the congested district of the city. For 3 miles it follows United States Highway Route 422, the main route to Girard, Niles, Warren and Cleveland and one of the heaviest traveled highways in the United States. The new cars were specially designed for service on this line after a careful study of the route.

For a number of years the Youngstown property has been operated on a 100 per cent one-man basis, with an actual increase of schedule speed over former two-man operation. The first installation of one-man cars in the city was on the line where the new cars are now being used. This installation was made in 1923 with Birney cars. It was thought that the short headways on which the Birney cars were operated would be effective in meeting jitney competition. Experience showed, however, that on a line more than 7 miles long, extending some $3\frac{1}{2}$ miles in each direction from the Central Square, the use of the small cars was not economically desirable.

As the new cars are much larger in seating capacity, the service can be given with fewer vehicles. Moreover. this change was accompanied by a reduction of ten minutes in the round-trip running time, due to the more rapid acceleration and deceleration of the new equipment. As a result it has been possible to eliminate fourteen runs from the schedule with a large saving in operating expense. At the same time this change released a number of Birney cars for use in tripper service elsewhere, thus enabling the company to retire from service twelve cars which were too heavy for economical operation.



Brill 177-E-1-X trucks are used with Westinghouse 1425A motors and WN drive

Previous to the actual installation of service on this line approximately 70 operators had been thoroughly drilled in the operation of the cars. Since a large proportion of the operators on the Youngstown Municipal Railway have been many years in the service and consequently are comparatively old men, it was feared that some trouble might be experienced in the use of the foot control. However, the universal reaction of the men was that the new method of control was more convenient than the hand control. There has been no resentment and no criticism of this type of control from any operator. The typical reaction of the operators is shown by the report of one of the Transportation Intermediate Safety Committees, the first four of whom are car operators and the last two bus operators. Their opinion is the general opinion of the men on the property. The report reads as follows:

> We, the members of the Intermediate Safety Committee of the Youngstown Municipal Railway Company, on the morning of March 18, 1930, made an inspection trip on the new 850 class car.
>
> The car was in regular passenger service on the Mosier-Campbell line.
>
> During the course of this trip we had an opportunity to examine and observe the action of all safety devices with which this type of car is equipped.
>
> The many comforts and conveniences afforded the passengers, the ease with which this type of car is operated by the foot controls, and other new features, in our opinion, places this type of car far in advance of other equipment with which we are familiar, both from a safety and an operating point of view.

The public reaction to the new cars has been entirely favorable. The quick pick-up, quietness, ease of operation and the extraordinary vision afforded the passenger have quickly popularized the car with the riders.

Single Life vs. Renewable Track

Additional opinions from way engineers concerning basic principles of track design and construction

THAT it is not worthwhile to design track with the intention of replacing worn rail with new rail on the old ties and foundation is the belief held by two way engineers whose opinions were received too late for inclusion in the article published in the April issue of the JOURNAL.

It is realized by everyone, according to W. W. Wysor, chief engineer, United Railways & Electric Company of Baltimore, that the rails on which cars operate will sooner or later have to be replaced on account of wear and deterioration from natural causes, but attempts have been made from time to time to construct a foundation which would be more or less permanent and which it would not be necessary to renew when rails were replaced. Such attempts have met with varying degrees of success depending upon methods adopted, thoroughness with which the work was carried out and local conditions. By local conditions are meant not only the conditions which prevail in any one town or community but the conditions that vary with each street location and with different sections of the same street. It can be said, however, without fear of contradiction that none of these plans has been 100 per cent successful.

Granting that it is beyond the realm of possibility to secure a rail that will in itself be permanent, since it is subjected to wear, the ideal arrangement, Mr. Wysor believes, would be to have a foundation of permanent character on which the rails would rest, so that it would not be necessary to disturb the foundation when reconstructing track but merely to unfasten the rails from their holding device and put in place a new set of rails. If the track foundation were built after the manner of foundations for our bridges and skyscrapers we might conceivably hope for a permanent sort of foundation, but even then such parts as were used as fastenings or direct support for the rail would be subjected to corrosion and wear and it would be necessary to renew them along with the rail.

However, any such foundation is out of the question from both the standpoint of cost and practicability, and since the streets are filled with other underground structures such as water pipes, gas pipes, heating pipes, sewers, conduits, etc., many of which extend directly under the track area, the roadbed supporting the track is subjected to settlements which occur at more or less frequent intervals depending upon the nature and extent of the underground structure and the frequency with which the street is opened for extensions to or repairs on these structures. In addition to that, the city reserves to itself the right to change grade and this is frequently done in connection with a change in character of paving. It would seem, therefore, that there is no practical way of securing a type of track foundation that could be considered permanent for the following reasons:

The immediate support of the rail, usually some sort of tie plate is subjected to wear and corrosion, and by the time the rails are worn out these plates are usually not fit for further service.

If tie plates are not used and the rail rests directly on ties, then the ties themselves are subjected to wear, as well as decay or corrosion, and proper bearing for the new rail on the old ties cannot be secured.

The support for the rails, whether by ties, stringers, blocks or what not, is subjected to settlement which not only throws the tracks out of surface but also frequently out of line. These settlements may be due to natural causes where the underlying ground is soft or from artificial causes where the street is built on a fill or where water leaks occur or where openings have been made for underground structures either belonging to the city or to other public service corporations, or even to private parties.

Grade of the street may be changed by the city authorities.

It is the opinion of Mr. Wysor, therefore, that as a general proposition tracks should be constructed with a type of foundation that will give adequate support for the rail during its entire life, but when the time comes to renew the rail that it will be necessary to also renew the supports, even though in some cases much of the supports may be salvaged and used again.

A similar opinion is held by H. E. Bean, chief engineer, New York State Railways, Syracuse, who points out that when the time arrives for the renewal of the rail on the old structure, it is quite probable that a general resurface of the whole street will occur. At such times, considerable changes occur in underground structures of other utilities or municipalities in making renewals, relocations or additions and cuts are bound to occur across the railroad area.

It is doubtful if rail could be renewed on an old structure with as good results of surface, stability and appearance as if the whole foundation were replaced. The utility might be nearly as good but the ultimate saving, everything considered, would be insufficient to merit extraordinary expenditures for this purpose alone, especially in view of the disposition to substitute buses on many of the present car lines. It is possible to construct track locally for a minimum life of 20 years and it would seem, according to Mr. Beau, that expenditures for possible life beyond that point would be purchasing possible insurance at a very high rate.

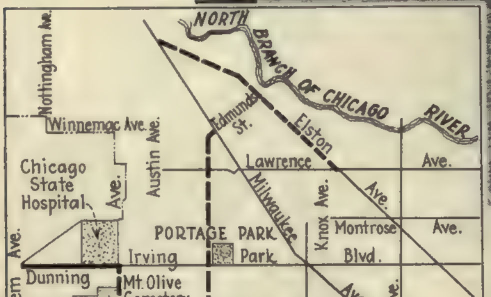
"Improving Design to Meet Present Day Demands"

All of the industry's major objectives will be treated in articles, showing how equipment design has aided in raising the standards of service, in

The **Annual Convention Number** *of* **Electric Railway Journal**

TO APPEAR ON
JUNE FOURTEENTH

Flexibility of movement in traffic is one of the major advantages of the trolley bus



New trolley bus extensions will serve northwest section of Chicago

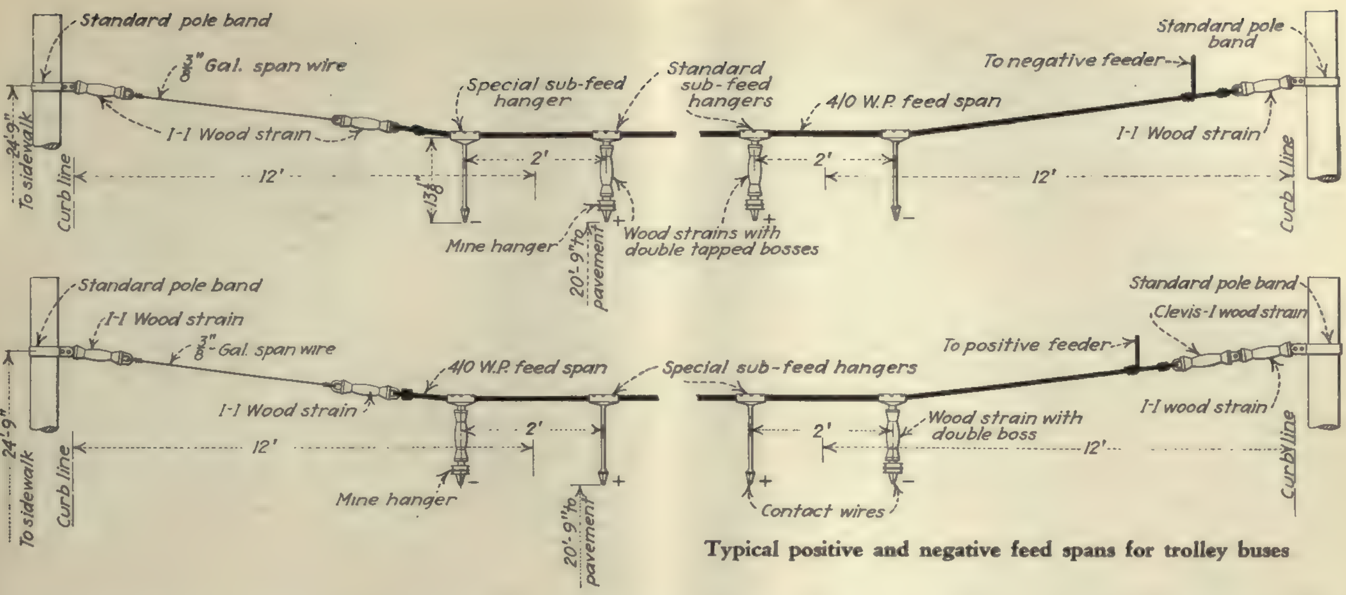
Chicago Inaugurates Largest Trolley

WITHIN four months the Chicago Surface Lines will be operating the largest fleet of trolley buses in the United States. Forty-one vehicles, recently purchased and embodying the latest developments in design, will serve five routes in the northwest section of the city. The total mileage to be covered, consisting for the most part of extensions to present street car lines, will be 17 miles. Service was actually begun on April 17 on Diversey Avenue, a route of 3.75 miles. Thirteen trolley buses are providing a three-minute service during the rush hours and a seven-minute headway in the off-peak hours on this line.

The inauguration of this service is the result of a decision by the Illinois Commerce Commission on March 6, withdrawing Chicago Motor Coach buses from the streets in the northwest section of the city and directing the Chicago Surface Lines to establish bus service as extensions of its rail lines in this territory. This decision is important in that it recognizes the principle that the extension of service should be provided by the utility established in the field. When the state commission in 1928 gave the Chicago Motor Coach Company permission to operate on these streets, it ignored this principle and the courts have held the order void on appeal prosecuted by organized citizens of the community. The people objected to motor coach service which required a 10-cent fare with transfers only to Motor Coach lines, and demanded bus extensions of street car lines on the basis of a 7-cent fare with transfers to the Chicago Surface Lines system.

Eight routes were included in the commission's order for bus substitution, five of which will be served by trolley buses and three by gasoline buses. The lines to be served by trolley buses, together with their mileage, are as follows:

Diversey Avenue	3.75 miles
Narragansett Avenue	3.0 miles
North Avenue	0.5 miles
Central Avenue	7.5 miles
Elston Avenue	2.75 miles



Typical positive and negative feed spans for trolley buses

Bus System

First line in 17-mile program put into operation on April 17. Within four months 41 trolley buses will serve five routes. Important principle established by substitution decision

Gasoline bus service will be installed on the following lines:

Belmont Avenue	2 miles
Irving Park Boulevard	1 mile
103rd Street	1 mile

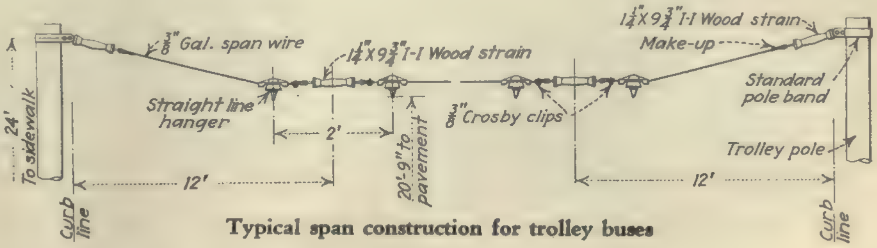
Orders were placed immediately following the decision of the commission, and with the co-operation of the Twin Coach Company, the J. G. Brill Company and the St. Louis Car Company, who rushed construction of the equipment, service was begun on scheduled time and will be installed within the four-month period ordered. The total order consists of 29 Twin Coaches, 6 Brill-American Car Company, and 6 to be built by the St. Louis Car Company.

In addition to the trolley bus service on Diversey Avenue, gasoline buses were placed in service on Belmont Avenue on April 17. Four buses are being used on this line as a temporary measure. It is contemplated that this route will eventually be served by trolley buses. Bus service on 103rd Street, a route of 1 mile, will be installed early in May. Three buses will be used on this route. Only one bus will be necessary on the Irving Park extension. Twin Coaches now owned by the Chicago Surface Lines will be put into service on these three routes.

Listed elsewhere in this article is a table giving the specifications of the new trolley buses. However, a number of very noteworthy features should be considered separately. The Twin Coaches will be equipped with Westinghouse motors, controllers, air brakes and compressors, while the Brill and St. Louis vehicles will use General Electric design for this equipment. Each bus will be equipped with an Edison 12-volt storage battery No. B1-H10, eighteen-hour capacity, which will be charged through the air compressor circuit. Due to the fact that there are certain short stretches on the line where the polarity of the overhead will be reversed, a polarized relay is used to prevent the discharge of the battery. This 12-volt circuit is used for the operation of the treadle on the rear door, for the marker lights on both front and rear of the bus and for the two emergency lights inside the bus.

Both the brakes and controllers are foot-operated. The pedals are placed on the right-hand side of the steering column to be operated with the right foot, the control pedal on the right. They are so spaced that both cannot be operated at the same time by one foot. Pressure on the brake is proportionate to the pressure on the pedal. All buses will have the brake applied by self-lapping valves operated by the pedal. An application valve is placed near the rear wheels so that braking will take place on these wheels first. A quick release valve is placed near the front wheels so that they will release first to facilitate steering.

On the left of the steering column and so located as to be foot-operated are the button for the horn and an electric foot switch for the operation of the fare register. Also on the left of the operator and in a convenient position for hand operation is the reversing mechanism,



Typical span construction for trolley buses as well as a push button to be used for setting the rear treadle door for automatic operation. The door-operating mechanism for the front door is controlled by a valve in front of the operator. Likewise, the various switches for lighting circuits are placed directly in front of the operator under the windshield.

The ventilating system was carefully considered. It was designed by the engineers of the Chicago Surface Lines and subsequently built by the Railway Utility Company. It is believed that the ventilators used on this new equipment have a greater exhausting capacity than any previously used. The two intake ventilators are at the rear of the bus and feed air through the body to six exhaust ventilators placed in the center and front of the bus.

Trolley Bus Specifications

Equipment	Twin Coach	Brill-Amerıcrn Car Co.	St. Louis Car Co.
Axle, front	Timken Detroit No. 1669W	Timken Detroit No. 1669W	Timken Detroit No. 1669W
Axle, rear	Timken Detroit Ratio 10¼ to 1	Timken Detroit No. 6536 double bowl. Ratio 10¼ to 1	Timken Detroit No. 6536 double bowl. Ratio 10¼ to 1
Battery	Edison 12-volt storage. B1-H10 18 hr. capacity	Edison 12-volt storage. B1-H10 18 hr. capacity	Edison 12-volt storage. B1-H10 18 hr. capacity
Brakes	Westinghouse air brakes	General Electric air brakes	General Electric air brakes
Buzzers	Consolidated Car Heating. Pull cord operation	Consolidated Car Heating. Pull cord operation	Consolidated Car Heating. Pull cord operation
Chassis—Framing	Structural steel, bi-metal side girder	Steel—Steel sheeting on outside and panel lining inside	Aluminum—Aluminum girder and lining construction
Posts	1¼x1¼x¼" steel tees	U-shaped steel	U-shaped steel
Color	Red and cream with gray roof	Red and cream with gray roof	Red and cream with gray roof
Compressors	Westinghouse D.H-10; 10 cu.ft. per min.	General Electric C.P-25, 10 cu.ft. per min.	General Electric C.P-25, 10 cu.ft. per min.
Controller—Master	Westinghouse XM 164	General Electric C-507	General Electric C-507
Main	WestinghouseV.A. (variableautomaticaccel.)	General Electric P.C.M. (automatic accel.)	General Electric P.C.M. (automatic accel.)
Current collection devices Swiveled Harps Trolley Poles Trolley Bases Retrievers	Ohio Brass Co.	Ohio Brass Co.	Ohio Brass Co.
Dimensions			
Length over all	31 ft. 10 in.	33 ft. 5 in.	31 ft. 11 in.
Width over all	96 in.	95¾ in.	96 in.
Step	15 in.	14 in.	15 in.
Riser	13 in.	13 in.	13 in.
Minimum headroom	74 in.	74½ in.	76 in.
Doors, front	Double passage, 44-in. minimum clearance	Double passage, 46-in. minimum clearance	Double passage, 44-in. minimum clearance
Doors, rear	Treadle operated, 30-in. clearance	Treadle operated, 33-in. clearance	Treadle operated, 30-in. clearance
Door controls	National Pneumatic air operated	National Pneumatic air operated	National Pneumatic air operated
Flooring	Brown battleship linoleum, $\frac{3}{16}$ in. thick	Brown battleship linoleum, $\frac{3}{16}$ in. thick	Brown battleship linoleum, $\frac{3}{16}$ in. thick
Headlights	Type WCF dash illuminating, Ohio Brass	Type WCF dash illuminating, Ohio Brass	Type WCF dash illuminating, Ohio Brass
Heaters	Consolidated Car Heater Co. Sixteen 500-watt heaters at 560 volts One 1,200-watt cab heater	Consolidated Car Heater Co. Sixteen 500-watt heaters at 560 volts One 1,200-watt cab heater	Consolidated Car Heater Co. Sixteen 500-watt heaters at 560 volts, One 1,200-watt cab heater
Horn	Westinghouse, air operated, single tone	Westinghouse, air operated, single tone	Westinghouse, air operated, single tone
Lighting 600-volt circuit	Twelve body lights in dome fixtures Three sign box lights Two step lights Two headlights One tail light Head and sign lights on separate circuit	Twelve body lights Three sign box lights Two step lights Two headlights One tail light Head and sign lights on separate circuit	Twelve body lights Three sign box lights Two step lights Two headlights One tail light Head and sign lights on separate circuit
Battery circuit	One stop light Two 25-watt interior emergency lights Front and rear marker lights	One stop light Two 25-watt interior emergency lights Front and rear marker lights	One stop light Two 25-watt interior emergency lights Front and rear marker lights
Mirrors	Three, two inside, one to treadle door, one to rear, one outside rear view	Three, two inside, one to treadle door, one to rear, one outside rear view	Three, two inside, one to treadle door, one to rear, one outside rear view
Motors	Two 50-hp., Westinghouse model 1426CT6	Two 50-hp. General Electric model, GE298E	Two 50-hp., General Electric model, GE298
Registers, fare	International R-10, electrically operated by foot button	International R-10, electrically operated by foot button	International R-10, electrically operated by foot button
Roof	Arched	Arched	Arched
Seats	Semi-bucket, leather upholstered	Semi-bucket, leather upholstered	Semi-bucket, leather upholstered
Seating capacity	40 passenger	40 passenger	40 passenger
Tires, front, rim and size	20 x 10.50	20 x 10.50	20 x 12.00
Tires, rear, rim and size	24 x 7 duals	20 x 9.75 duals	22 x 9.75 duals
Trolley pole spacing	24 in.	24 in.	24 in.
Ventilators	Railway Utility Co., Honeycomb type, two intake and six exhaust ventilators. Air movement 15 m.p.h. or 5,400 cu.ft. per hr. per ventilator	Railway Utility Co., Honeycomb type, two intake and six exhaust ventilators. Air movement 15 m.p.h. or 5,400 cu.ft. per hr. per ventilator	Railway Utility Co., Honeycomb type, two intake and six exhaust ventilators. Air movement 15 m.p.h. or 5,400 cu.ft. per hr. per ventilator
Weight	17,500 lbs. (scale)	17,700 (estimated)	16,000 (estimated)
Wheelbase	195 in.	216 in.	212 in.
Windshield	Non-shatterable glass	Non-shatterable glass	Non-shatterable glass
Windshield wipers	Two—air operated	Two—air operated	Two—air operated

Special overhead "Y" construction at Harding and Diversey Streets

The ventilators are of the honeycomb type, and are designed to handle an air movement of 15 m.p.h., or 5,400 cu.ft. per hour per ventilator. With a bus empty the air can be completely changed every two minutes.

Special attention was given to the design of the doors, their operation and dimensions. The front doors are built for double passage, either entrance or exit, and have a minimum clearance of 44 in. They are of the double jackknife type and are mechanically operated by National Pneumatic equipment. The rear doors have a clearance of 30 in. and are treadle operated.

The lighting of the bus is arranged on four circuits, exclusive of the battery circuit. The advantage of these different circuits is that in case a fuse blows in one or the other there will always be light at the front and rear of the bus. The head and sign lights are on separate circuits for this reason and likewise the two rear interior dome lights are on a circuit with the sign lights, so that in case anything happens to the tail light these two rear inside lights will furnish sufficient illumination for the rear of the bus.

The overhead system is quite completely described in the accompanying two drawings, which show typical positive and negative feed spans and typical tangent spans. The trolley wires are spaced 24 in. apart, as are the trolley bases on the bus equipment. The wires used on the installation are the Phono-Electric, the high conductivity wire being manufactured by the Bridgeport Brass Company, and a hard-drawn copper wire by the American Brass Company. The ears were supplied by the R. R. Holden Company and are of the pressed copper underslung type. The greater part of the special overhead equipment consisting of hangers, span insulators, insulated and non-insulated special cross-overs, insulated approaches, and frogs of the standard and spring type were supplied by the Ohio Brass Company. Power is being supplied to the various lines from the existing substations of the Chicago Surface Lines, and General Electric automatic sectionalizing switches have been installed at certain points to assure the proper amount of current being supplied to any one section. These switches automatically assist in supplying current to the existing street car lines as well as to the new trolley bus lines.

An Ohio Brass swivel harp. The swivel casting is mounted on the lower casting over a 4½-in. ball bearing

Improvements in body design, comfort and speed have been important factors in the renewed interest in trolley buses

Central Master Mechanics Discuss Equipment

New and reconditioned bearings compared. Lubrication extensively discussed. Papers presented on flat top journal bearings, trolley buses and trolley wire lubrication

IMPROVED maintenance methods, new equipment, and interurban exchange practices were enthusiastically and extensively discussed at a two-day meeting of the Central Electric Master Mechanics Association in Mansfield, Ohio, April 9 and 10. Delegates from the leading railways of seven states as well as many manufacturers' representatives participated in the three business sessions.

The value of new bearings as compared to those reconditioned and the methods of reconditioning them were the principal subjects of the first session. A. B. Creelman, superintendent of equipment, Pennsylvania-Ohio Power & Light Company led the discussion by presenting a paper which pointed out the difference in service obtained from the use of new journal and armature bearings, as compared to those reconditioned in the average railway shop. Quoting from experience he told of the results obtained by using different type bearings and showed that his company had received better results with new solid bronze bearings. While emphasizing his preference for this type of bearing, he pointed out that babbitt can and is being used with success, but that the difficulty in reconditioning bearings with babbitt lies in the inadequate equipment the operators now have at their disposal for doing such work. He does not believe that in the average shop the shells can be tinned and the babbitt replaced as well as a manufacturer can do it.

One of the most interesting discussions of the convention was that of the use of flat top journal bearings. H. A. Barbero, master mechanic, Chicago, Elgin & Aurora Railroad, told of the excellent results which his company has obtained with the use of flat top journal brasses. The points he stressed in his discussion were that the additional weights and slightly additional cost were overcome by the greatly increased efficiency and considerably longer life of the flat top brasses over those now in general use.

G. M. Wood, Westinghouse Electric & Manufacturing Company, discussed at some length the renewed interest in the trolley bus and supplemented his talk with two reels of moving pictures showing trolley buses in operation in Salt Lake City. He reviewed the history of the trolley bus and pointed out the defects of the earlier equipment. He then showed how these defects had been overcome to make the new trolley buses attractive, comfortable and efficient. He quoted some figures from the installation in Baltimore, stating that the cost of operation of trolley buses in that city was approximately three-quarters of that of the gas buses. His data showed that a trolley bus could be operated for approximately 21 cents per mile, exclusive of fixed charges.

At the afternoon session, E. J. Jonas, superintendent of equipment, Cincinnati Street Railway, discussed "The Pull-in Record as an Index to Maintenance and Inspection Efficiency." He compared maintenance practice with that of manufacturing a product. He stated that the rejection volume of the inspection department of a manufacturing company is the measure of manufacturing efficiency, and that complaints from users are a reflection on inspection. Likewise he believes that pull-ins in car operation are a reflection on maintenance inspection.

Current collection by means of the trolley shoe, and trolley wire lubrication were the subjects of a talk given by W. J. Vaughn, representing Del A. Smith, general manager, Department of Street Railways, Detroit. Experiments with the use of trolley shoes and trolley wire lubrication are being extensively carried out by the Detroit Street Railway and, although not yet completed, excellent results so far have been attained. According to the reports given by Mr. Vaughn, a shoe collector running beneath a properly lubricated wire will not only eliminate arcing and subsequent burning of the trolley wire, but will treble the life of the wire itself. A lubricant composed of a graphite base has been used with success. It not only acts as a perfect conductor but builds up on the wire thus protecting it from wear. Some very interesting figures were presented. During a period of nine months there is a record of one line having withstood 265,000 car passes without showing any appreciable wear. Actual micrometer tests have been made at regular intervals.

Two other papers were read and discussed at this meeting; namely, "Application of Tool Steel Gear Drive for High Speed Motors," by E. S. Sawtelle, vice-president, Tool Steel Gear & Pinion Company; and "Naco Spun Steel Car Wheels and Their Manufacture," by J. T. Kittredge, manager, National Malleable & Steel Castings Company, Sharon, Pa.

Supplementing the morning discussion on journal bearings, President Challeen opened a discussion on the placing of responsibility for repacking journal boxes after cars had been operated through water. It was decided by the convention that the operating company handling equipment through water would be responsible for removing the waste and repacking the journal boxes before the cars so operated were put back into interchange service.

A banquet concluded the activities of the first day. Musical selections given by the Eastern Michigan Railways Quartet were much enjoyed, and Henry R. Cordell made an address which was filled with humor, although he struck a serious note in his discussion of safety.

The second day's business meeting was held in the assembly room of the Ohio Brass Company's general offices. At this session a questionnaire which had been previously mailed to the members of the association was discussed in detail. Several new standards of operation were adopted as a result of general opinion, the most important of which was the adoption of the 27-inch wheel for city service.

At the close of this business session officers for the coming year were elected. In recognition of excellent work done during the past year, A. J. Challeen was re-elected president, and E. J. Jonas vice-president. Following this meeting a luncheon was served in the cafeteria of the Ohio Brass Company. Luncheon was followed by a tour of inspection of the company's foundries and machine shops.

An auxiliary trip of inspection was made on the day before the convention opened by delegates representing thirteen railways. These men started from Cleveland in a bus chartered from the Cleveland-Akron-Canton Bus Lines, going to Sharon, Pa., as guests of the National Malleable & Steel Castings Company.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
March, 1930........	809,658	680,035*a*	....	129,623	72,867
March, 1929........	822,436	691,166*a*	....	131,270	70,626
12 mo. end. Mar., 1930	9,572,827	9,016,971*a*	....	1,555,856	858,530
12 mo. end. Mar., 1929	9,661,460	........*a*	....	1,394,866	655,384
Jacksonville Traction Co., Jacksonville, Fla.					
February, 1930	90,293	68,575	9,069	11,905	....
February, 1929.......	96,057	76,164	9,545	8,778	....
12 mo. end. Feb., 1930	1,132,832	923,458	108,002	95,172	*63,095*
12 mo. end. Feb., 1929	1,187,548	962,346	107,094	111,719	*50,646*
Honolulu Rapid Transit Co., Honolulu, T. H.					
February, 1930.......	82,620	51,782	8,819	22,968	11,141
February, 1929.......	84,525	48,624	12,758	24,321	13,100
2 mo. end. Feb., 1930	169,477	106,289	17,638	47,739	24,084
2 mo. end. Feb., 1929	173,132	100,216	25,620	49,696	27,255
Chicago Surface Lines, Chicago, Ill.					
March, 1930.........	4,792,936	4,529,014	....	263,922	214,275
March, 1929.........	5,478,280	4,251,192	....	1,227,088	222,744
United Railways & Electric Co., Baltimore, Md.					
March, 1930.........	1,484,031	1,001,977	147,521	349,499	81,082
March, 1929.........	1,460,771	979,245	151,752	347,648	66,357
3 mo. end. Mar., 1930	4,256,860	2,917,456	420,850	954,994	123,455
3 mo. end. Mar., 1929	4,135,425	2,858,033	418,457	901,495	53,345
Boston Elevated Railway, Boston, Mass.					
February, 1930.......	2,764,782	1,923,654	135,821	710,118	18,035
February, 1929.......	2,801,609	2,014,647	143,955	647,064	*53,235*
Department of Street Railways, Detroit, Mich.					
March, 1930.........	2,032,503	1,676,643	65,099	299,022	149,881
March, 1929.........	2,443,222	1,990,391	62,545	397,111	265,607
12 mo. end. Mar., 1930	25,473,102	20,331,761	758,622	4,490,703	2,781,689
12 mo. end. Mar., 1929	25,512,219	20,099,836	768,286	4,863,064	3,039,020
Twin City Rapid Transit Company, Minneapolis, Minn.					
3 mo. end. Mar., 1930	3,579,496	2,539,930*a*	....	1,039,566	433,611
3 mo. end. Mar., 1929	3,763,826	2,666,280*a*	....	1,097,546	463,036
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
February, 1930.......	85,460	62,802	4,800	23,562	*7,752*
February, 1929.......	85,144	60,704	7,840	19,315	*12,084*
2 mo. end. Feb., 1930	180,135	130,820	9,600	50,676	*11,651*
2 mo. end. Feb., 1929	174,367	125,489	15,680	38,358	*24,657*
Brooklyn-Manhattan Transit System, New York, N. Y.					
March, 1930.........	5,153,556	3,243,489	353,488	1,623,550	849,685
March, 1929.........	4,222,986	2,638,395	292,482	1,460,286	712,816
9 mo. end. Mar., 1930*d*	45,326,553	30,068,995	2,947,461	12,964,215	5,986,172
9 mo. end. Mar., 1929	36,023,524	23,254,505	2,511,749	11,028,718	4,697,675
Brooklyn & Queens Transit System, New York, N. Y.					
March, 1930.........	1,970,570	1.525.494	119,617	345,543	224,761
March, 1929.........	2,071,507	1,687,707	113,695	292,065	164,427
9 mo. end. Mar., 1930	17,653,096	13,878,279	1,033,734	2,931,226	1,800,071
9 mo. end. Mar., 1929	17,952,129	14,880,654	967,260	2,298,088	1,140,789
Hudson & Manhattan R.R., New York, N. Y.					
March, 1930.........	1,078,807	531,327*a*	....	547,480	212,760
March, 1929.........	1,091,214	546,208*a*	....	545,006	208,945
3 mo. end. Mar., 1930	3,159,261	1,580,962*a*	....	1,578,299	574,712
3 mo. end. Mar., 1929	3,144,641	1,593,934*a*	....	1,550,707	543,728
Interborough Rapid Transit Co., New York, N. Y.					
February, 1930.......	5,758,313	3,530,575	201,846	2,025,891	*291,455*
February, 1929.......	5,569,751	3,309,333	200,690	2,059,726	267,611
8 mo. end. Feb., 1930	47,915,484	29,911,581	1,614,802	16,389,100	*1,430,964*
8 mo. end. Feb., 1929	45,313,307	28,193,370	1,603,521	15,516,415	1,121,661
March, 1930.........	6,436,421	3,902,136	262,622	2,271,662	*199,385*
9 mo. end. Mar., 1930	54,351,905	33,813,717	1,877,425	18,660,762	*1,630,349*
New York Railways, New York, N. Y.					
January, 1930........	457,586	428,713*a*	....	28,873	*34,242b*
January, 1929.... ...	491,959	463,064*a*	....	28,895	*33,495b*
February, 1930.......	410,838	388,816*a*	....	22,022	*39,964b*
February, 1929.......	446,822	417,000*a*	....	29,822	*46,758b*
2 mo. end. Feb., 1930	868,424	817,530*a*	....	50,894	*74,196b*
2 mo. end. Feb., 1929	938,781	880,062*a*	....	58,719	*80,243b*
New York, Westchester & Boston Ry., New York, N. Y.					
February, 1930.......	189,794	109,845	24,715	55,787	*171,766*
February, 1929.......	173,549	121,483	19,686	33,003	*169,087*
2 mo. end. Feb., 1930	401,117	232,486	49,023	120,880	*338,261*
2 mo. end. Feb., 1929	364,384	252,335	38,480	74,914	*341,704*
Third Avenue Railway, New York, N. Y.					
February, 1930.......	1,138,330	885,472	85,384	185,456	*53,211*
February, 1929.......	1,173,098	909,000	83,206	298,882	*58,721*
8 mo. end. Feb., 1930	10,064,774	7,780,159	710,235	1,731,054	*307,063*
8 mo. end. Feb., 1929	10,223,779	7,914,433	725,021	1,734,552	*307,244*
Philadelphia Rapid Transit System, Philadelphia, Pa.					
3 mo. end. Mar., 1930	13,830,657	10,573,137*a*	....	3,459,279	3,219,229
Galveston-Houston Electric Railway, Houston, Texas					
February, 1930.......	40,121	22,843	2,604	14,676	....
February, 1929.......	46,575	25,045	2,567	18,961	....
12 mo. end. Feb., 1930	572,912	324,854	32,477	215,773	*52,988*
12 mo. end. Feb., 1929	635,463	361,211	31,730	242,520	*28,523*
Houston Electric Company, Houston, Texas					
February, 1930.......	259,882	165,109	22,505	72,268	....
February, 1929.......	264,573	168,729	25,233	70,610	....
12 mo. end. Feb., 1930	3,360,970	2,076,664	269,119	1,033,052	635,647
12 mo. end. Feb., 1929	3,355,195	2,081,378	290,707	983,109	571,573

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Pacific Northwest Traction Co., Seattle, Wash.					
February, 1930.......	72,097	56,359	4,050	11,685	....
February, 1929.......	64,336	58,856	3,571	1,906	....
12 mo. end. Feb., 1930.	979,000	710,943	54,879	213,176	97,510
12 mo. end. Feb., 1929	878,212	746,357	51,311	80,543	*63,137*
Calgary Municipal Railway, Calgary, Alta.					
2 mo. end. Feb., 1930	181,756	107,046	....	74,710	22,611
2 mo. end. Feb., 1929	....	....	....	....	30,020
Edmonton Radial Railway, Edmonton, Alta.					
February, 1930.......	75,916	45,917	....	29,998	2,771
February, 1929.......	76,979	43,343	....	33,636	5,288
2 mo. end. Feb., 1930	161,151	98,939	....	62,211	5,098
2 mo. end. Feb., 1929	156,092	89,601	....	66,490	8,794
Ontario Hydro-Electric Rys., Essex District, Windsor, Ont.					
3 mo. end. Jan., 1930	293,370	235,863	1,403	56,104	*35,890*
3 mo. end. Jan., 1929	....	....	....	....	27,641*c*
Saskatoon Municipal Railway, Saskatoon, Sask.					
2 mo. end. Feb., 1930	87,823	51,688	3,474	32,661	7,726
2 mo. end. Feb., 1929	....	....	....	....	15,714

a Includes taxes. *b* Before adjustment bond interest. *c* Before renewals. *d* Includes Brooklyn & Queens Transit System.

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Paris Subway System Expands

EXTENSIVE additions to the Paris subway system, or the "Metropolitan," as it is better known, are under way. In order to reach certain sections in the city which have been inadequately served, some 31 km. (19.2 miles) of lines are being constructed. The program has been accelerated on account of the Colonial Exposition which will be held next year in the Bois de Vincennes. Besides these, the demolition of the ancient fortified wall has removed the barrier to expansion of the city and has created a demand for rapid transit to the centers of the adjacent communities. The Department of the Seine, by action of Dec. 24, 1929, created a transportation district enabling the extension of subway lines beyond the old limits established by the walls. In all, fifteen projects for extensions have been made, totaling 33 km. (20.5 miles), and carrying most of the existing routes beyond their present terminals at the city gates.

The Nord-Sud subway company, which originally was independent, has been merged with the Metropolitan, and on Jan. 1 of this year became an integral part of that system. In general, the routes of the Nord-Sud are non-competitive and serve to extend the network of subway lines which cover Paris. The total length of existing lines, including the Nord-Sud, is now approximately 123 km. (76.3 miles).

The principal construction within the city will be extensions of Routes 8 and 9 under the Grand Boulevards from the Opéra and Chaussée d'Antin stations, where they respectively terminate, to Place de la République, in a two-level, four-track subway. From there Line 8 will continue to the Bois de Vincennes at the entrance to the exposition.

Another important piece of construction being carried on is the extension of Route 7 from Ponte Marie, under the Seine to Place d'Italie, and thence to the borough hall of Ivry. Route 10 is being extended from the Odéon to Place Jussieu, with a connection to the extension of Route 7 at Place Monge.

The construction in general is of reinforced concrete with an arch type roof, a single tunnel containing the two tracks. The sections under the Seine and along its banks are of the cast-iron sectional type.

Careful organization and accurate scheduling of work enabled Cleveland Railway to rebuild track on Euclid Avenue in record time

Accurate Work Schedules Permit Speedy

FREQUENTLY it happens that there is occasion for unusual speed in rebuilding track on an important business thoroughfare in the congested section of a large city. Such operations require unusual concentration of equipment and special organization of the various labor gangs required, together with a most careful scheduling and planning of every phase of the work, in order that it may be completed within the time limit set. As track reconstruction on a large scale interferes with both car and vehicular traffic, as well as the conduct of normal business, it is a matter of serious concern to the merchants on the street involved. It is to the interest of the railway, the abutting business houses and the general public that the normal use of the street be interfered with as little as possible.

A problem of this nature recently confronted the Cleveland Railway in connection with the rebuilding of its tracks in Euclid Avenue, between East Ninth and East Fourteenth Streets. The methods that were employed in the solution of this problem were unusual but effective.

This work involved the replacement of slightly more than 1,200 lin. ft. of double track on what is probably the heaviest traveled street in Cleveland both as regards street railway and vehicular traffic. The old track was paved with asphalt and bituminous concrete pavement laid on a concrete base. It was constructed of 102-lb. T-rail on shallow steel ties. This track had itself been laid on top of an older steel tie track with concrete base, all of which had to be completely removed. The new track was constructed with A.E.R.E.A. standard 7-in. 122-lb. girder grooved rail, with joints electric welded by the carbon-arc hand-feed method. The ties were pressure-treated, creosoted red oak on 2-ft. centers, with tilted tie plates on every tie. Rail was fastened to the ties with screw spikes and clips, the ties being prebored. Tierods were installed every 6 ft., and joint baseplates were provided under every joint. The track was laid on a coarse slag base which

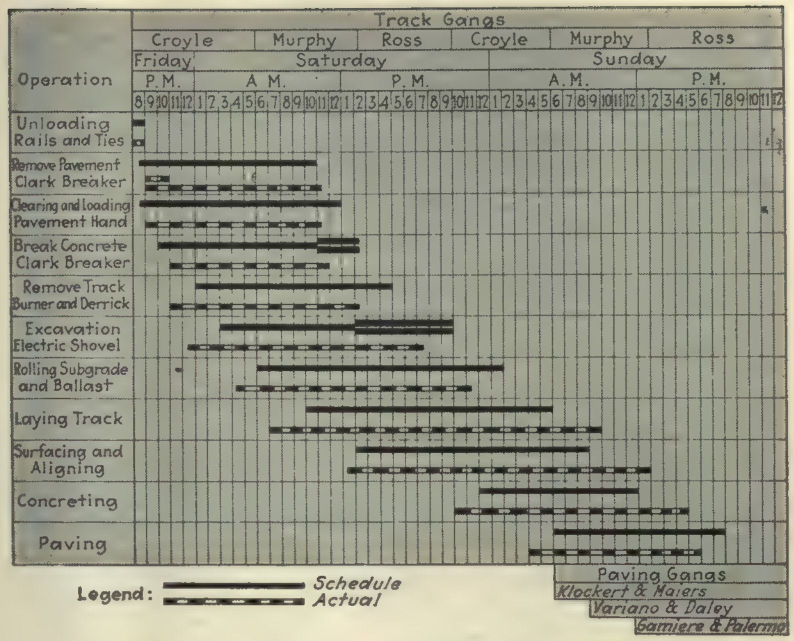
Track Reconstruction

By

H. H. GEORGE

**Superintendent of Way
Cleveland Railway**

Replacement of 1,200 lin. ft. of track on Euclid Avenue in business section of Cleveland was completed in 49 hours. Breakdown of equipment during work was avoided by careful inspection prior to start. Operations were arranged to follow each other in close sequence. Vehicular traffic suffered no interruption



Operations were scheduled to follow each other in close sequence

had been placed on a thoroughly rolled subgrade, and then this slag also rolled to a depth of 8 in. The tamping of the track and surfacing was done with 2 in. of fine slag, dampened to assist in compacting under the ties. The track was concreted between ties and to the top of the rail clips, and was paved with granite block. The blocks along the outside of the outer rail of each track were bedded directly in green concrete and also backed up with concrete to the depth required for abutting asphalt pavement outside the track area.

The main retail business stores in the territory affected were closed on Saturdays during the month of August, and plans were accordingly made to do the work during that month. The eastbound track was rebuilt first, work being started at 8 p.m. on Friday, Aug. 2, and the final pavement of the new track was completed at 9 p.m. on Sunday, Aug. 4. The work on this first track included the removal of the pavement and its concrete base in the devilstrip, but did not include the repavement of the devilstrip. The work on the second track started at 8 p.m., Friday, Aug. 9, and the last pavement of the track, including the entire devilstrip, was completed at 6 p.m. on Sunday, Aug. 11. During reconstruction, the cars were rerouted over tracks located one block south of their regular route, but the movement of vehicular traffic on Euclid Avenue was not interrupted for a single minute in either direction. A great deal of credit was due the city Police Traffic Department for its co-operation in enforcing temporary no-parking regulations and in keeping through traffic moving.

The scheduling of the various operations required the most carefuly study and consideration of the limitations of each piece of equipment. It meant a thorough check of the mechanical condition of the equipment to guard against and minimize the possibility of delay in the schedule due to breakdown of equipment. The wisdom of such a check was proved during the course of the two week-end operations, no

Electric shovel digging out the old track

Work train delivering material

Summary of Man and Equipment Time

Total cost—material	$20,845.34
—labor	12,021.66
Total	$32,867.00
Total number of feet, single track	2,403.4
Average cost of lineal foot	$13.68
Man-hours required	15,772
Motor-truck hours	280
Work-car hours	1,633
Derrick-car hours	210
Air-compressor hours	372½
Acetylene-burner hours	145
Clark concrete-breaker hours	144
Electric-shovel hours	259
Roller hours	32
Power-grader hours	28
Rail-grinder hours	120
Concrete-mixer hours	77
Welding-machine hours	394
Thermit-welding hours	51

Concentration of mechanical equipment permitted speedy work

breakdown occurring during the first week-end and only one during the second, this being the failure of a concrete mixer, which involved a loss of time of two hours in this and subsequent operations.

From a study of the accompanying schedule chart, it will be seen that each operation was scheduled to follow the preceding one in a regular sequence and in close order. Each gang was continually pressing the operation ahead of it to keep out of the way, and was constantly on its toes to keep out of the way of the gang behind it. The tabulation shows how the three eight-hour shifts were scheduled to take up where the previous gangs left off, and also how all equipment was scheduled for arrival at the job. The deviation from this schedule was surprisingly small.

Pertinent figures for these operations are given in the following table. In this connection it should be noted that, in each case, the hours given represent a 25 per cent excess over actual hours worked, this being the bonus given all hourly labor on the job as a premium both for speed and for the fact that these men worked steadily through the rain, nights and on Sunday. It was felt that the over-time allowance was fully justified and well earned. The base rate for labor was 55 cents per hour. The over-time represented an extra labor cost of exactly $1 per foot of track rebuilt. In each instance the equipment hours reported included all idle or waiting time.

Schedule of Euclid Avenue Reconstruction Work

(Westbound Track)

TRACK GANGS

Foreman	Number of Sub-Foremen	Number of Laborers	Starting Time	Starting Date	Finishing Time	Finishing Date
J. Croyle	4	60	8 p.m.	Aug. 9	6 a.m.	Aug. 10
J. Murphy	5	65	6 a.m.	Aug. 10	2 p.m.	Aug. 10
C. Ross	3	60	2 p.m.	Aug. 10	10 p.m.	Aug. 10
J. Croyle	4	60	10 p.m.	Aug. 10	6 a.m.	Aug. 11
J. Murphy	5	65	6 a.m.	Aug. 11	2 p.m.	Aug. 11

PAVING GANGS

	Pavers					
M. Klockert	8	18	6 a.m.	Aug. 11	....	Aug. 11
J. Maiers	7	18	6 a.m.	Aug. 11	....	Aug. 11
J. Verriana	7	13	9 a.m.	Aug. 11	....	Aug. 11
W. Daley	7	12	9 a.m.	Aug. 11	....	Aug. 11
D. Palermo	7	15	12 m.	Aug. 11	....	Aug. 11
J. Gamiere	7	15	12 m.	Aug. 11	....	Aug. 11

EQUIPMENT

	Time on Job	Start	Date	Finish	Date
Derrick (new rail)	8 p.m. Aug. 9	8 p.m.	Aug. 9	9 p.m.	Aug. 9
Derrick (new rail)	8 p.m. Aug. 9	8 p.m.	Aug. 9	9 p.m.	Aug. 9
Air compressor	8.30 p.m. Aug. 9	8.30 p.m.	Aug. 9	10 a.m.	Aug. 10
Clark breaker No. 1	8.30 p.m. Aug. 9	8.30 p.m.	Aug. 9	2 p.m.	Aug. 10
Clark breaker No. 2	8.30 p.m. Aug. 9	8.30 p.m.	Aug. 9	4 p.m.	Aug. 10
Burning car	10.30 p.m. Aug. 9	10.30 p.m.	Aug. 9	4 p.m.	Aug. 10
Derrick (old rail)	10.45 p.m. Aug. 9	10.45 p.m.	Aug. 9	6 p.m.	Aug. 10
Shovel	12 m. Aug. 9	2 a.m.	Aug. 10	9 p.m.	Aug. 10
Roller-grader	2 a.m. Aug. 10	4 a.m.	Aug. 10	1 a.m.	Aug. 11
Concrete mixer	11.30 p.m. Aug. 10	12 p.m.	Aug. 10	4 p.m.	Aug. 11

BILL OF MATERIAL

Material	Quantity	Cars	Material	Quantity	Cars
Slag, 3 in.	350 tons	19	Bolts	2 kegs	..
Fine slag for tamping	100 tons	6	Rods (tie)	204 only	..
Ties (drilled)	530 only	..	Gravel (plus outside)	400 tons	15
Ties (blank)	84 only	..	Cement	1,700 bags	..
Rail	1,211 feet	2	Block (granite)	1,250 sq.yd	13
Plates (tie)	1,142 only	..	Block, granite (headers)	105 sq.yd	1
Plates (joint)	42 only	..	Slag (fine), pavement	90 tons	5
Spikes (screw)	14 kegs	..	Sand	63 tons	3½
Clips	13 kegs	..	Special flat steel tie plates, ½-in.	20 only	..
Splices	42 pair	..			

Use of Dynamometer Successful in Stringing Trolley Wire

Experience in Cleveland shows that correct tensions can be obtained by testing when the wire is cut in. Failures experienced have been very few since this method has been used

By **ANGUS G. SCOTT**
Assistant Superintendent of Overhead Lines
Cleveland Railway

ALL trolley wire on the Cleveland Railway is strung with the use of a dynamometer. Under climatic conditions in that city it has been found very satisfactory to use this method, and the appearance of the overhead indicates that the tensions obtained are very uniform.

One important point to observe in stringing wire is to have a tension sufficient to provide a good running surface for the trolley wheel, and yet not to exceed the elastic limit of the wire. Under no circumstances should the ultimate strength be exceeded, even in the most severe weather likely to be encountered in winter. In order to be sure that the tension is kept at the proper point, a table has been worked out for copper and for phono-electric wire, calculated for 85 deg. from 30 deg. F. to 90 deg. and for 10, 20 and 100 deg. Table I, which appears with this article, gives the calculated tension to which the trolley wire must be drawn when it is erected.

It will be remembered that as the temperature rises the wire will increase in length and if the temperature falls it will decrease. Accordingly, when the wire expands the tension will decrease, and when the wire contracts it will increase. The temperature-tension table included herewith has been figured to compensate for this change of tension with temperature. For instance, standard hard-drawn trolley wire, strung at 60 deg. F. should be pulled to a tension of 1,700 lb. If the temperature falls to 10 deg. the tension in the wire will increase to about 2,500 lb. If the temperature falls to zero or below, wire less than 0.25 in. in diameter or equal to the opening in the No. 00 gage furnished the line crew will pull apart and break.

When the wire is pulled to tension with the dynamometer it is necessary to exercise care to bring it to the value indicated in the table. If the tension is increased, the wire will reach its breaking strength at a higher temperature. Accordingly, wire which has been worn to a diameter of 0.25 in. would not be safe at temperatures reached in the climate of Cleveland. On the other hand, if the tension is decreased the wire will be too slack and will wear out quickly.

The dynamometer used in stringing wire is of the Chatillon spring type. This dynamometer has a small range of error, one calibrated showing 50 lb. high on a 2,500-lb. pull and increasing in a constant ratio. For convenience in handling, each dynamometer is carried in a box made for it, along with a special link having a double clevis for attaching to the dynamometer and to the clamp which is fastened to the wire. The box also contains a thermometer for ascertaining temperature at the time the tension is read.

Table I—Trolley Wire Tension to Be Obtained by Use of Dynamometer

Temperature Deg. F.	No. 00 Gage Copper	No. 00 Gage Phono-electric	No. 0000 Gage Copper
10	2,500	2,950	3,900
20	2,350	2,750	3,650
30	2,200	2,550	3,425
35	2,100	2,450	3,325
40	2,000	2,350	3,200
45	1,925	2,250	3,100
50	1,900	2,150	3,000
55	1,825	2,050	2,900
60	1,700	1,950	2,750
65	1,625	1,850	2,550
70	1,550	1,750	2,400
75	1,475	1,700	2,275
80	1,400	1,600	2,100
85	1,325	1,500	2,000
90	1,250	1,400	1,900
100	1,100	1,200	1,625

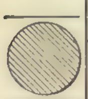
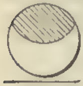
When the tension on the wire is to be tested where already in service, one side of the dynamometer is attached to the wire, using the special clamp and link which is provided for the purpose. Blocks are attached to the dynamometer and are pulled steadily until the first slack appears. The dynamometer is then to be held at this point and the scale is read. This procedure is followed whenever it is desired to ascertain if the wire is maintained at the proper tension.

When new wire is being pulled to tension, the same procedure is followed, except that care must be taken not to pull the wire far beyond the desired tension, nor to lose any of the tension while cutting in the spliced or dead ends. It also is essential not to jerk the wire while pulling it in to tension. The wire is pulled up to about 50 lb. more than the desired tension to allow for slacking off in attaching.

Since it is essential that the tension be made to correspond with the one which has been figured out for the particular temperature at which the wire is installed, particular emphasis is laid on the necessity of reading the thermometer whenever the dynamometer reading is taken. If this is not done, the accuracy of the plan is sure to fail.

Another precaution that must be taken to insure against damage is that the wire must not be pulled to tension on curves, in intersections, or against badly worn trolley wire, until an inspection has been made. If a wire remaining in place appears to justify, the new wire may be pulled to tension. The lineman must use his judgment in doing this. For instance, it is unwise to pull No. 0000 wire to tension at the point where it connects with No. 00 standard wire. Instead, it is necessary to absorb enough of the tension on the No. 0000 wire, by attaching the fitting before splicing it into the No. 00 wire. By following these simple instructions no difficulty has been experienced in the use of the dynamometer in stringing wire.

Table II—Relation Between Breaking Strength and Wear for No. 00 Wire, Phono-electric and Copper

Diag.	Vertical diameter of worn wire, mils	Area, sq.in.	Copper		Phono-Electric	
			Breaking strength, lb.	Condi-tion	Breaking strength, lb.	Condi-tion
	364.8	0.1046	5,520	New	8,200	New
	300	0.08108	4,280	Good	6,360	Above new copper
	275	0.07214	3,810	Fair	5,650	Still above new copper
	250	0.0633	3,340	Dan-gerous	4,960	Above good for copper
	200			Renew wire		
	200	0.0466	2,460	Down	3,650	Dangerous
	150	0.0311	1,640	Down	2,435	Must come down

Maximum life, No. 0000 wire: Breaking strength 4,400 on maximum. Vertical diameter 300 mils to 285 mils.

Maximum life, No. 00 wire: Breaking strength 2,900 on maximum. Vertical diameter 230 mils. Area 0.055 sq.in.

When Wire Should Be Renewed

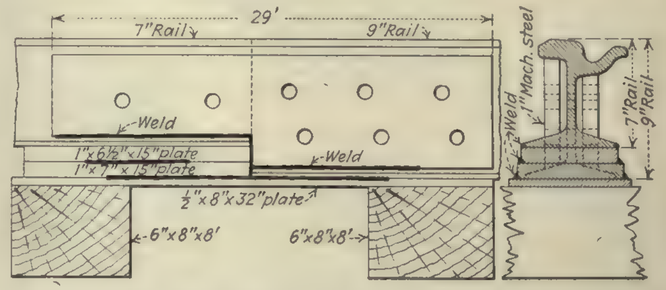
In determining whether worn wire is to be renewed or not, reference is made to a chart which has been prepared for the purpose. This chart is reproduced herewith. It will be noted that copper wire is given four classifications: New, good, fair, dangerous. When the vertical diameter of the No. 00 wire is less than 200 mils, it must be renewed. High-strength phono-electric wire, it will be noted, has a much greater breaking strength and may be allowed to remain in the line until it reaches a considerably smaller diameter than the copper wire. Phono-electric wire of 150 mils vertical diameter must be renewed.

Built-Up Compromise Joint*

By H. Bragg

Principal Assistant Engineer
United Railways & Electric Company
Baltimore, Md.

SATISFACTORY results have been obtained in Baltimore from the use of a compromise joint made by placing a baseplate to span the space between the ties, and built up under the low rail with plates. The baseplate, liftplates and base of the rail are welded together by the electric arc process. An accompanying illustration shows a compromise joint recently made where a 9-in. rail was joined with a 7-in. rail. Varying widths of plates are used to provide the necessary welding shelf.



Compromise joint with baseplate spanning space between two ties and low rail supported by two liftplates

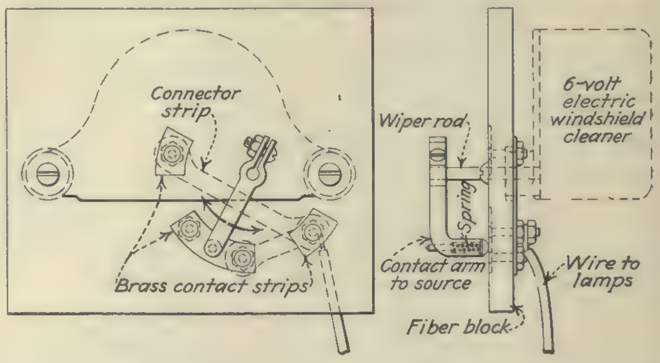
◆

Flashing Danger Lights on Tower Trucks*

By H. A. Brown

Foreman Return Circuit, Switch and Signal Division
Cleveland Railway

TOWER trucks of the switch and signal division of the Cleveland Railway have been equipped with a device which flashes all of the electric danger lights mounted on the vehicle. These lights are intended to prevent collisions when repairs are made at night on the overhead construction. The flasher was made from an old 6-volt windshield wiper which was provided with contacts mounted on a fiber block and placed below the wiper in such a manner that each sweep of the wiper arm makes and breaks the circuit to the red danger lights. The device is mounted in a water-tight box placed beneath the floor board, where it is out of the way. It is controlled by a conveniently placed snap switch.



Electric windshield wiper is used as flashing apparatus for the red lights on trucks of the Cleveland Railway

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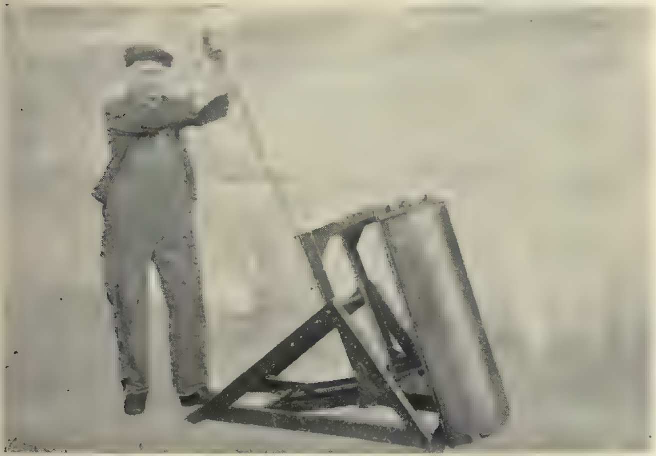
*Submitted in Electric Railway Journal *Prize Contest.*

Tilting Bench for Controller Repairs*

By E. J. Jonas

Superintendent of Equipment Cincinnati Street Railway

INSTEAD of installing a hoist to raise controllers to the overhaul bench, the Cincinnati Street Railway has devised an adjustable stand upon which the controller is placed in a nearly vertical position, and which is then tilted until the controller is in a horizontal position 40 in. above the floor. The framework consists of two triangular sides made of angle iron, with a cradle for the controller pivoted between the upper apexes of the side numbers. The cradle is provided with a flange at one end upon which is placed the bottom of the controller to be overhauled. The shopman then raises the controller to a horizontal position by means of a lever, and inserts a pin to hold the cradle stationary. This device has an advantage over a fixed workbench and hoist in that it can easily be moved to any desired location in the shop.



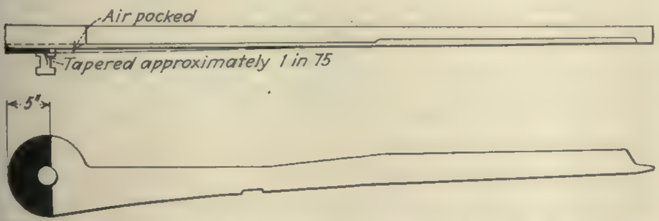
Tilting controller workbench used in shops of the Cincinnati Street Railway

Switch Tongues Built Up by Welding*

By G. E. Picklesimer

Supervisor of Switches and Signals Roadway Department Georgia Power Company

SWITCH tongue heels of the Georgia Power Company are kept up to the surface of the rail by inserting shims as needed. When the heel is worn about $\frac{1}{4}$ in. the tongue is taken out and the under side of it built up with $\frac{3}{16}$ in. high-carbon steel, hammering the hot metal down to a taper of approximately 1 in 75, depending on the length of the tongue. The tongue is then allowed to cool, after which it is ready for service until it is worn to such an extent that this operation must be repeated.



Worn switch tongues are repaired by welding shim to under side

It will be noted that an air pocket is left under the tongue and just forward of the pin. This is done so that whole shims of the same diameter as the heel of the switch, can be used. Otherwise it would be necessary to use half shims at the heel of the tongue and this would be very unsatisfactory as they soon work out of place. If the entire heel of the tongue were built up and a whole shim used it would not give the bearing at the heel which is desired.

The Georgia Power Company has at present 300 switch tongues which have been built up by this welding method and are giving satisfactory service, not causing any trouble except for the occasional installation of shims. This method of building up was inaugurated in 1923 and until that time switch tongues had to be inspected weekly in order to adjust the shims.

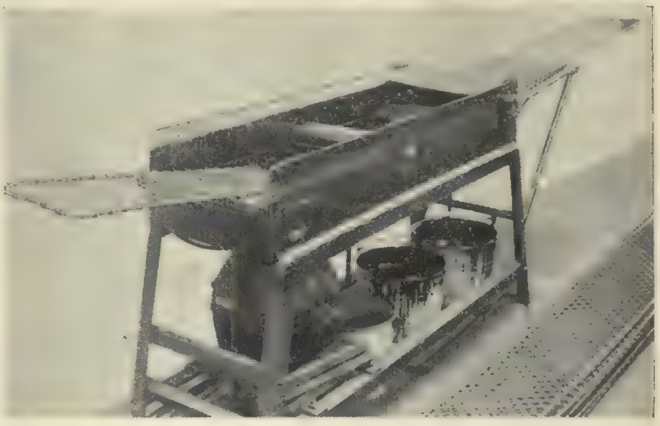
◆

Window Guard Painting Machine*

By Terance Scullin

Superintendent Buildings and Equipment Cleveland Railway

FASTER painting of wire-mesh window guards is now done in the paint shop of the Cleveland Railway by means of a simple device which both dips and brushes the paint on the screen. The window guard is pushed by hand into the right end of a trough, as shown in an accompanying illustration, down underneath the roller into the center of the tank, which immerses it completely in the bath. Further pushing brings the guard in contact with the sloping bottom, which directs it up and out of the paint between two motor-driven brushes, rotating at 120 r.p.m. From this point the guard is pulled through the rest of the way from the opposite end and then hung up to dry. Dipping alone would leave an excess amount of paint on the guard, forming beads when dry, then when the surface of any of these beads was broken fresh paint would be exposed, spotting any clothing with which it came into contact. Brushing aids in preventing damage claims from this cause. Previously, all window guards were painted by hand, one side at a time. This method was exceedingly slow and not nearly as thorough as the present system. A workman with this machine can paint 3½ sets of window guards in an hour, where formerly it required one man 2¾ hours for a set. The approximate cost of this machine is $25, exclusive of the motor.



Window guards are painted at a rate of 3½ sets per hour by one man using this machine in the shops of the Cleveland Railway

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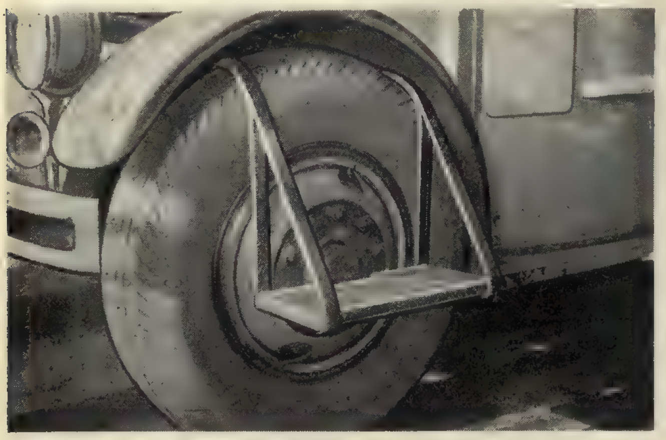
*Submitted in Electric Railway Journal Prize Contest.

Stand Facilitates Bus Motor Adjustment*

By Hoy Stevens

Superintendent of Maintenance Motor Coach Department
Cleveland Railway

IN ORDER to facilitate motor and general repair work on heavy-duty high-capacity coaches, such as the White 54A or the Yellow Z240, the mechanic's stand illustrated has been developed by the bus division of the Cleveland Railway. The dash and front fender construction of large buses make it impossible for a mechanic standing on the floor to lean over or between the fender and body and do any work on the motor.



For making adjustments on motors of large buses a stand for the mechanic has been made in the shops of the Cleveland Railway

This stand is so built that it can be mounted on the front wheel over the tire. Due to its small size and the cut-out in the center for the hub cap of the wheel there is little or no danger of slipping. It makes a convenient, safe and portable stand for the mechanic while making repairs or adjustments, placing him in a position where he can reach the motor and other units with little difficulty. The step is not expensive and it has been found valuable in making minor operating repairs.

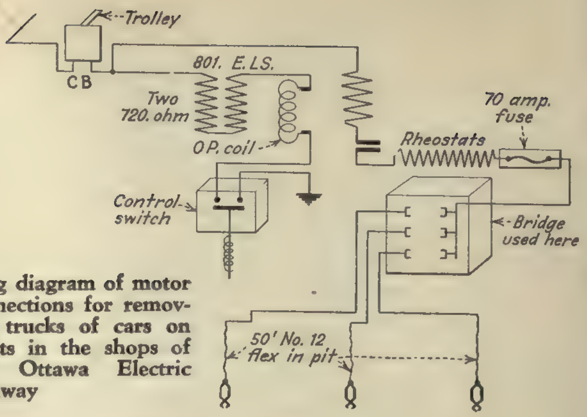
◆

Removing Trucks from Cars on Hoists*

By J. Munford

Electrical Foreman Ottawa Electric Railway

CONVENIENT apparatus for moving trucks out under power from beneath cars on hoists in the shops of the Ottawa Electric Railway has been designed, a spare 801-E-4 line switch and some old car resistance units being used. The switch and resistance units are placed under the platform of the middle pit of the three which are in the shop. A hand-operated control is placed on a pit column where a clear view of the three pits can be had. Cable runs from the junction box in conduit sunk in the cement floor to the three pit outlets. From there a 50-ft. piece of No. 12 flexible wire is connected to the cutout lead on the motor by means of a battery clamp. A reversing switch, made from a K-10 reverse cylinder cut in half, is mounted with fingers and chairs to a portable board with an iron back, which is hooked onto the side of the truck frame to give a ground connection. Three flexible leads each 3 ft. long are provided, with battery clamps attached, connecting to the three remaining motor leads. A kick on the cross-bar, which is welded to the cylinder shaft, is sufficient to reverse the trucks. This apparatus has been in constant use in the shops for two years and has given very satisfactory service.



Wiring diagram of motor connections for removing trucks of cars on hoists in the shops of the Ottawa Electric Railway

◆

Pressure Lubrication of Overhead Trolley Wire

MARKED success has attended the use by the Eastern Michigan Railways of a new method of lubricating overhead trolley wire. The apparatus used for this purpose consists of a spray nozzle attached to the trolley harp of a line car and connected by flexible hose with a reservoir tank at one end of the car body. A pressure of 20 lb. per square inch is maintained in the reservoir by tapping the regular air supply of the car. Under the trolley harp a receptacle is provided to catch any excess lubricant. The lubricant itself, called "Lubrion," is made in the form of paste, which is mixed with water in the amount of 1 lb. to 1 gal. After being sprayed on the wire the water evaporates leaving a dry deposit, which neither collects dust and grit nor acts as an insulator, as compounds containing oil or grease sometimes do. The lubricant is manufactured by the Efficiency Products Company, Detroit.

Apparatus used by Eastern Michigan Railways for applying lubricant to trolley wire, showing receptacle to catch excess liquid

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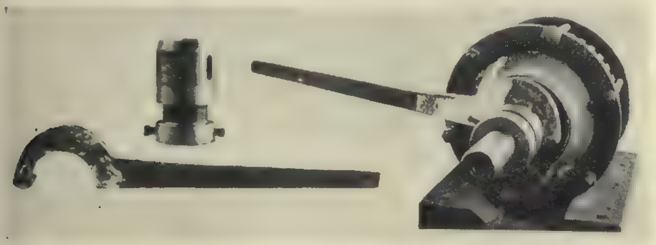
*Submitted in Electric Railway Journal Prize Contest.

Special Armature Nut Wrench

By W. R. McRae

Superintendent of Rolling Stock and Shops
Toronto Transportation Commission

A SPECIAL sleeve wrench has been designed for service in the shops of the Toronto Transportation Commission, for the removal of GE-80 armature body nuts. The top part of sleeve is cut out to fit over projections in the armature nut, and is also threaded on to the lower part, the latter being held firmly to shaft by means of two set screws. The thread on the sleeve has the same pitch as the armature nut, so that when the wrench grips the slots in the sleeve and turns, the top part of sleeve screws on to the lower fixed portion, as the nut loosens. The old method of removal of these nuts caused considerable breakages, whereas the method described eliminates breakage and is a great time saver.



Special wrench developed by the Toronto Transportation Commission for removing armature nut from GE-80 motor

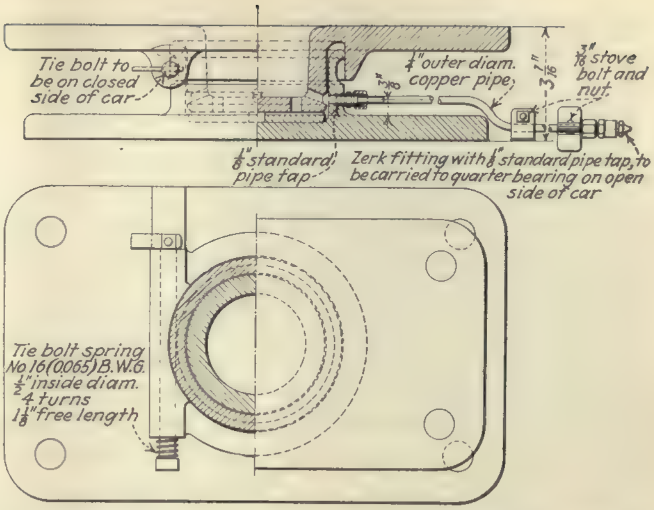
◆

Center Bearing Lubrication Simplified

By H. S. Williams

Assistant Superintendent of Equipment
Department of Street Railways, Detroit

LUBRICATION of center bearings of car trucks is made easy by a method developed by the Department of Street Railways, Detroit. In the type of bearing to which this method has been adapted, no king pin is used. The bearings are locked together by means of a horizontal pin of cold rolled steel which occupies a groove turn in the lower half. The purpose of this is to prevent the entrance of grit to the bearing surface as the plate has been made of case-hardened steel ground smooth. The lower half of the center bearing is provided with a copper tube which leads outward to the extreme end of the thrust bolster. This outer end of the tube has a Zerk fitting. All that is then necessary to apply the lubricant is a Zerk gun. A central chamber is provided with holes leading from the bearing surfaces so that any excess oil will tend to flow into this chamber, thus giving the added advantage of an oil reservoir. For this reason it is important that a groove be turned in the upper member of the center bearing opposite the oil groove opening. Unless this is done, it is possible that the oil tube will become plugged.


Tie bolt to be on closed side of car
1/4" outer diam. copper pipe
3/16"
3 1/16"
3/16" stove bolt and nut
1/8" standard pipe tap
Zerk fitting with 1/8" standard pipe tap, to be carried to quarter bearing on open side of car
Tie bolt spring No.16(0.065)B.W.G. 1/2" inside diam. 4 turns 1 1/8" free length

Zerk fitting used by Department of Street Railways, Detroit, for lubrication of truck center bearings

> *Final period of*
>
> ## Maintenance Contest
>
> *begins May 1*
>
> **You have three more months to get in the running for the Annual Awards.**
>
> **Don't delay. Send in your ideas at once.**

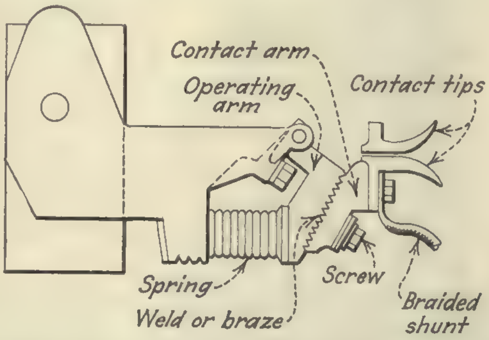
◆

Preventing Loose Breaker Tips*

By E. C. McGinnis

Electrical Foreman
Dallas Railway & Terminal Company, Dallas, Tex.

CAR failures have sometimes occurred in Dallas when the lower contact arm of a line breaker came loose. In the type of breaker with which this has happened the contact arm is bolted to the operating arm to form a unit which swings upward to close the circuit. The abutting surfaces are corrugated to make possible adjustment for wear of the contact tips, the two parts being held together with a capscrew and lock washer. Continued operation loosened the screw, allowing the contact arm to drop down and prevent closing of the circuit.



By welding the lower contact arm of the line breaker to the operating arm, a source of failures has been eliminated in Dallas

It was found that the tips wear out before an adjustment is necessary. Accordingly, it was decided to braze the contact arm permanently in place against the operating arm and dispense with the adjustment. This method has been found satisfactory, and has eliminated a source of trouble.

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*Submitted in Electric Railway Journal *Prize Contest.*

Gun Used for Electric Track Switch Lubrication*

By H. A. Brown

Foreman Return Circuit, Switch and Signal Division
Cleveland Railway

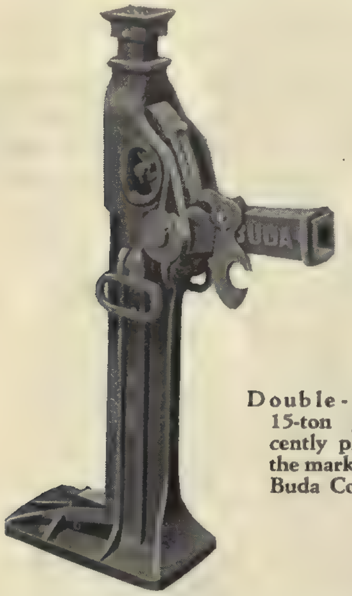
PROPER lubrication of the electric track switch mechanism located in the ground box has been facilitated on the Cleveland Railway by use of a specially designed lubricator for the levers and bushings. The bushings are sealed at the bottom by welding them to a circular steel disk. A hole $\frac{1}{8}$ in. in diameter is drilled through the center of the lever pin and tapped on the upper end to accommodate an Alemite grease fitting. When the parts are assembled, grease is forced down under pressure through the center of the lever pin and up between the outer surface of the lever pin and the bushing in a manner similar to that followed in greasing automobile shackle bolts. This method of lubrication has proved very satisfactory in service, forcing out all collected dirt, preventing water from entering the bushing, permitting a much closer adjustment of the mechanism, and providing thorough lubrication without the removal of the various parts.

Alemite grease gun for lubricating electric track switches on the Cleveland Railway

New Products for the Railways' Use

New Ratchet Jack

THE Buda Company, Harvey, Ill., has just placed on the market a new ratchet jack, known as No. 615, which replaces the old style Buda No. 6. This new jack, furnished primarily for heavy section or extra gang service, is of 15-ton capacity, double acting, 31 in. high with a $20\frac{1}{2}$ in. rise.



Double-acting, 15-ton jack recently placed on the market by the Buda Company

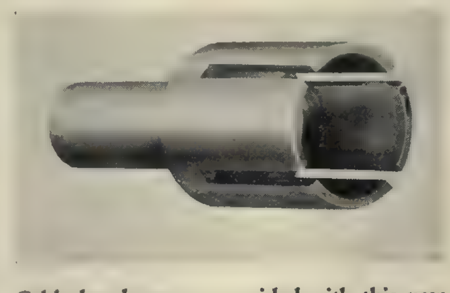
This jack weighs only 88 lb., having fewer parts than the old-style jack. The lever sockets are cast integral with the side plates. The lever socket is made of electric cast steel, heat-treated.

The new design has a special safety feature, in that the stop for the rack bar is located in the base of the jack, thereby avoiding the possibility of the operator mashing his fingers between the top of the rack and the frame.

◆

Terminal for Brush-Holder Leads

A NEW cable terminal has been developed by the Westinghouse Electric & Manufacturing Company to strengthen the leads where they enter the brush holder. The breaking of leads at this location is frequently due to the cable becoming nicked while removing the insulation. At this point stresses are concentrated and in time slight movements of the leads during service will cause failure to occur. One end of the new terminal is made large enough to fit over the insulation of the cable. This part of the terminal has four saw cuts which permit it being clamped to the cable. The bending which takes place in the lead to that part outside of the terminal is thus localized and prevents the cable from bending and breaking at its weakest point. The small end has an inside diameter sufficient to take care of the diameter of the bare cable and an outside diameter of the proper size to fit into the brush holder. It is important that the large end of the terminal be clamped to the cable so as to hold it securely, otherwise the cable will not be strengthened and the trouble with broken leads may occur.



Cable breakages are avoided with this new terminal for brush-holder leads developed by the Westinghouse Electric & Manufacturing Company

◆

Low Jack for Raising Buses

A FIVE-TON hydraulic jack which is $7\frac{5}{16}$ in. high when collapsed has recently been placed on the market by the Blackhawk Manufacturing Company, Milwaukee, Wis. This is known as Model M-7.3. A telescopic lift of $7\frac{3}{16}$ in. gives a total height of $14\frac{1}{2}$ in. To facilitate placing and removing, the jack is provided with a sled base and with a lantern type handle which gives it a comfortable grip. The saddle is serrated and forms an integral part with the plunger. The total weight is

Hydraulic 5-ton jack with sled base and lantern-type handle suitable for lifting low axle buses

25½ lb. with a 34-in. two-piece handle.

A heavier type jack, the D-8.7, is designed to lift 12 tons and is 8¾ in. high. It has a single lift of 5 in. and a 3-in. handscrew extension, or a total height of 16¾ in. The carrying weight of this model is only 31½ lb.

Improved Catenary Clip

GREATER clamping power with freedom from obstruction to current collectors are features of the new duplex hollow screw catenary clip manufactured by the Ohio Brass Company, Mansfield, Ohio. This device is used to suspend the trolley contact wire from the secondary messenger wire on compound catenary systems. Screw heads do not project on either side of the clamp, affording a trim appearance, and offering no obstruction to current collectors. On sharp curves, this characteristic is of considerable value as it will clear a pantagraph or wheel at any angle. Because the screw is entirely below the surface, it is possible to place it much closer to the trolley wire, thus obtaining the necessary strength with a thinner and lighter cross-section. The device is made of high-strength bronze or Flector malleable iron.

Catenary clip made by the Ohio Brass Company has countersunk screw, giving more freedom to passing collectors

Portable Mortar Flow Pulsator

FOR use in the construction of all types of concreted track the International Steel Tie Company has brought out a new type of portable mortar flow pulsator. This consists of an electric motor, on the shaft of which are carried two eccentric flywheels. The motor is set in a U-shaped frame which is placed on the head of the rail with the armature shaft parallel to the rail. In making either limited or extensive repairs, the portable pulsator can be used to vibrate a sand-cement grout of a small-aggregate concrete, filling the voids under and around the rail base.

Apparatus designed by the International Steel Tie Company to vibrate concrete used in track construction has an electric motor with eccentric flywheels mounted on the armature shaft

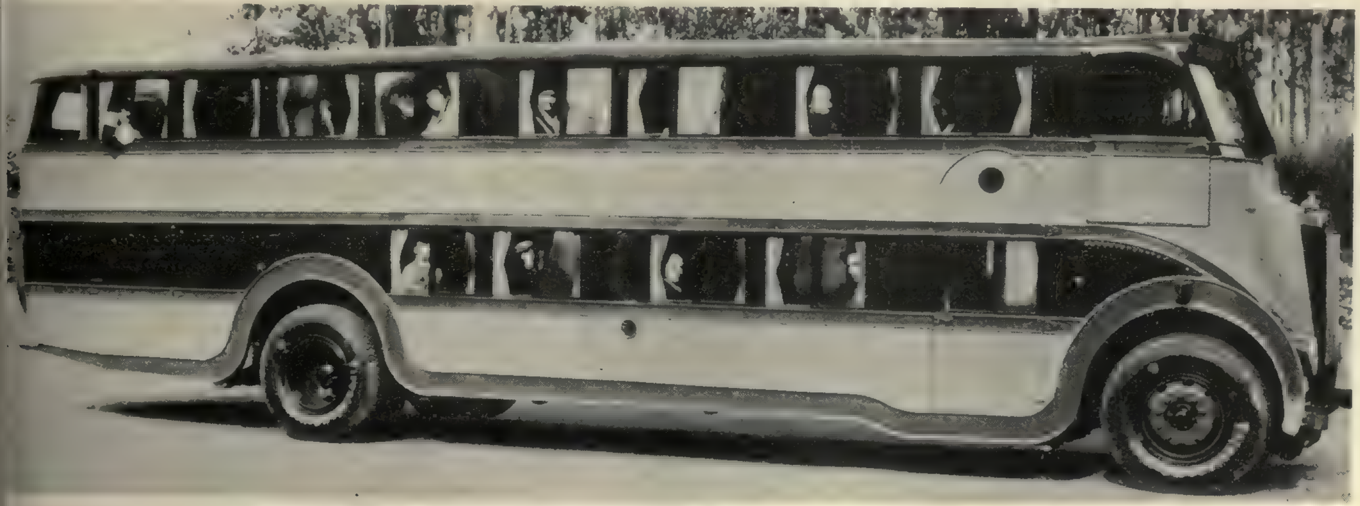
Double Deck Observation Bus Developed by Pickwick

DIFFERING in many important respects from previous designs a new 53-passenger double-deck observation coach has been developed by the Pickwick Motor Coach Works, Los Angeles, Cal. The new vehicle, which has a wheelbase of 246 in., is designed for intercity service. Unloaded weight is 17,000 lb. and the loaded weight is estimated to be approximately 25,000 lb. The total length is 33 ft., width 8 ft., and height 9 ft. 10 in. Although the new vehicle has practically twice the carrying capacity of the 27-passenger Pickwick de luxe coach, the cost of operation is said to be no greater.

Upper deck of Pickwick observation coach, showing reclining seats deeply upholstered and covered with velours

A baggage compartment is provided at the rear of the lower deck. Seats are of the reclining type deeply upholstered and covered with velours. A lavatory is located just behind and below the driver's compartment. As in the Pickwick "Nite Coach," a buffet can be installed in the front entrance passage so that meals can be served on portable tables if desired.

The body is of all-metal construction employing duralumin extensively. A six-cylinder Sterling "Petrol" engine, rated at 150 hp. and at 1,500 r.p.m., is used. The engine is so mounted that it can be removed easily and a complete new power plant installed in a short time.



Double-deck Pickwick observation coach seating 53 passengers and weighing 25,000 lb. loaded

NEWS *of the Industry*

LATE NEWS

San Diego, Cal.—The San Diego Electric Railway is reconstructing double track on Market Street, between Third and Fourth Streets and will follow immediately with reconstruction on University Avenue between Florida and Thirtieth Street, as the first two units of its $300,000 1930 program.

◆

Washington, D. C.—Public works and utilities construction contracts during first three months of 1930 were the largest in five years, representing combined valuation of more than $303,000,000, an increase of 56 per cent over first quarter of 1929, according to Secretary of Commerce Lamont.

◆

New York, N. Y. — The Nassau-Broad Street link of the Brooklyn-Manhattan Transit Corporation subway is now 80 per cent completed. Bids for completion of the Fulton Street and Broad Street stations will be received on May 9. The new line extends from the B.-M.T. tunnel at the Battery to a connection with the B.-M.T. system at the Municipal Building, to serve as a short-line downtown service eliminating the need of sending trains up Broadway to the Sixtieth Street tunnel to Queens.

◆

New Haven, Conn.—The Connecticut Company has petitioned the Public Utilities Commission for authority to substitute service by bus for through railway service between Hartford and Middletown and to substitute service by bus for trolley service in Middletown.

◆

Uniontown, Pa. — When the West Penn Railways completes its new $500,000 terminal and track relocation program in Uniontown during July, there will be a community celebration. Work on the new terminal has progressed rapidly.

◆

Seattle, Wash. — Ordinances appropriating $63,000 for reconstruction of Municipal Railway tracks on Pike Street and on West Spokane Street are before the City Council. The work on West Spokane Street is to be a part of the grade separation development. It is estimated to cost $42,000.

◆

New York, N. Y. — The Board of Transportation states that the Eighth Avenue subway will be open for fully 12 miles of its main length, between Broadway and 216th Street on the north and Fulton Street on the south, by the middle of July, 1931.

◆

Niagara Falls, N. Y. — The Public Service Commission has suspended the tariff filed by the International Railway proposing increased fares here to and including Aug. 14 next, unless otherwise directed by the commission. There will be a further hearing on the schedule, which proposes an 8-cent fare in place of 5 cents, with two tickets for 15 cents, at Buffalo on April 28.

(Late News Continued on Page 290)

New Chicago Unification Franchise Almost Ready

Financial Provisions of New Ordinance Still to Be Settled Before Measure Goes to Council. Negotiations Conducted in Liberal Spirit

AMONG the important points just settled in connection with the new coordination ordinance for Chicago was agreement on the financial return to the new company, according to the plan suggested by Attorney Fisher. The section provides a "fair and reasonable return" to the new consolidated company, but during the first three years it shall not be more than the separate companies earned last year, plus the same rate on new money invested. Any excess earnings are to be used to reduce the capitalization of the company. During the three years a minimum of $65,000,000 is to be spent on extensions and betterments.

The regulatory commission is to determine the "fair and reasonable return" after the initial three-year period, and any excess shall be turned over to the transit trustee of the city. The company will be permitted to appeal to the courts from the ruling of the commission on returns.

Present fares will continue under the new franchise. This will mean a 7-cent fare on the surface lines and a 10-cent fare on the elevated roads. Three cents will be charged for a transfer from the surface to the elevated lines, with free transfers from the "L" to the street cars. Transfers between the surface lines and the feeder buses will be free, but transfers between the buses and the elevated lines will cost 3 cents.

An unexpected provision, inserted last week, obligates the new consolidated company to remove the elevated structure in the loop, Chicago's central business district, after the subways to be built by the city have obviated need of the "L" there, and when its value has been amortized.

(Continued on Page 291)

COMING MEETINGS

April 29-May 1—United States Chamber of Commerce, Washington, D. C.

May 14-15—Association of Electric Railway Equipment Men, Middle Atlantic States, Scranton, Pa.

May 20-21—Public Utility Advertising Association annual convention, Washington, D. C.

June 16—National Association of Purchasing Agents, annual convention, Chicago, Ill.

June 23-26—American Electric Railway Association, 49th annual convention, San Francisco, Cal.

June 29-July 6 — International Transport Congress, Warsaw, Poland.

July 23-25 — Electric Railway Association of Equipment Men, Southern Properties, Nashville, Tenn.

Aug. 13-14—Wisconsin Utilities Association, Milwaukee, Wis.

$1,000,000 Oregon Project Approved

Authorization for the Oregon Electric Railway to construct its proposed extension in Linn County, and to operate in that county over the Southern Pacific company's line, has been given by the Interstate Commerce Commission.

The act of the commission opens the way for a $1,000,000 railroad development planned for many months. The proposed line would tap a great area of fine timber in the Santiam Valley, on the west slope of the Cascades.

Actual construction of track would start from Lebanon. The full project calls for steel clear to Cascadia, on the Santiam, a distance of 39 miles. There also would be the branch to a short distance above Holley in the Calapooia Valley, 14 miles; the Whitcomb branch of 8.5 miles and the McDowell Creek branch of 5.5 miles.

In addition, the Oregon Electric has an application pending for an extension into the upper Siuslaw Valley south and west of Eugene, in Lane County, that involves more than $1,000,000.

Speeding Up Central Territory Freight Service

Overnight freight service between Fort Wayne, Ind., and Cleveland, Ohio, has been started by the Fort Wayne-Lima Railroad and connecting electric railways. Through cars leaving Fort Wayne at 3:30 p.m. daily arrive in Cleveland early the following morning. The same fast schedule is maintained in the opposite direction. The schedule is arranged to make connections at Fort Wayne with fast freight runs to and from stations on the Indiana Service Corporation Lines, Union Traction Company of Indiana and connections beyond. Cars in this new service are operated over the Fort Wayne-Lima Railroad to Lima, Ohio; Cincinnati & Lake Erie Railroad to Toledo, and Lake Shore Electric Railway from Toledo to Cleveland.

Free Discussion of Problems of the Small-City Railway

With the view of obtaining a collective picture of the situation the committee on small-city operation of the Transportation and Traffic Association met in New York in a three-day session starting April 2. Chairman Spurr outlined a procedure, previously agreed upon, under which each member present took the witness stand and outlined the conditions on his property, subject to examination and cross-examination by the chairman, Leslie Vickers, economist, and the other members present. Any and all questions were admissible. The proceedings were confidential. More than twenty members and guests were present from properties under public ownership, under public trusteeship, as separate units, and as units of holding corporations.

Among the subjects discussed were past and present earnings, franchise obligations, taxation, paving requirements, public relations, fares, power rates, financial and corporate set-up, operating practices, and the place of the bus in the scheme of things. While the substitution of buses for trolley cars has in certain instances relieved companies from unduly burdensome paving and track rehabilitation work, the introduction of the bus has been accompanied by a variety of troubles peculiar to that vehicle. Some operators reported, however, that the public has taken more readily to an increase in fare where buses have been substituted. The weekly pass has been well received on a number of properties and has served to stimulate traffic and stabilize the passenger movement. From the standpoint of public relations, operators favor many riders at low fares to a smaller number of higher rates.

Members present expressed themselves as highly pleased with the procedure followed and with the results obtained. Hope was expressed that a similar series of conferences might be held in the future.

◆

Company Would Reopen St. Louis Wage Agreement

The St. Louis Public Service Company has notified officers of the Amalgamated Association that the company desires to re-open the existing wage scale and working agreement which expires on May 20. The agreement provides that either side may serve notice of its intention to re-open the agreement within 30 days of any expiration date.

Stanley Clarke, president, says the railway has no desire to decrease wages, but merely wants to clarify certain provisions in the award made by the Missouri Public Service Commission several months ago when the state body arbitrated a dispute between the company and the union.

The executive board of the union on April 17 voted not to re-open the contract although not satisfied with the wages and working conditions fixed by the commission. This feeling is reflected in a letter by the union in which the company is asked to withdraw its request that the working agreement be re-opened at this time.

The union said that if the company insists on a reconsideration of the agreement, the workers will then request that other sections be re-opened. The union also states that the Public Service Commission is not acceptable as an arbitrator if the union and company are unable to settle matters by conference.

Here's Another Point of View

THE editor of the railway publication intended for distribution to the public is always preaching to us to park our machines at home and ride the street car. Why do not the officers of the railway do that and spend 8 1-3 cents and help their company? Notice the machines around the railway building and figure three passengers to a car; what a difference it would make in a month's time! No, no, the officials are too good to associate with the common public.—*From a letter to a daily newspaper editor.*

Sale of Seattle-Tacoma Road Ordered

The Puget Sound Electric Railway, once operating between Tacoma and Seattle, Wash., has been ordered sold at public auction on June 16, by Judge Cushman, of the federal district court. No minimum price has been fixed. Agreement between two litigants, the Old Colony Trust Company, plaintiffs, and the Puget Sound Power & Light Company, defendants, that the property should be sold free of encumbrances, is believed to have precipitated the order of sale. The light company agreed to cancel its long-term leases for power line rights in event a sale is negotiated. When the line went into the hands of a receiver, Judge Cushman ordered service maintained until December, 1928, when it was shown that the road could not be operated at a profit. Receivers' certificates are outstanding in the amount of $50,000.

◆

Poster Competition Successful in Binghamton

Awards have been made in the poster competition fostered recently by the Triple Cities Traction Company, Binghamton, N. Y. There were two major awards, first and second, and eight honorable mentions. The contest provoked much comment favorable to the company. The contest was not altogether premeditated. For several years the company used a standard size advertising car card which fits into a frame placed on the signal box in front of the passenger as he is about to leave the car, a location also in plain sight of seated passengers. Previously this space was used for company notices, transfers, safety, red cross, and the like, but about three months ago the company put in a clever verse signed "From a Patron." Other patrons immediately wanted to see if they could not get into print. None, however, was willing to permit the use of his name. By February the supply had become so great that a change of copy became imperative every week. This led to the thought "Why not have a contest for the Binghamton Central High School?" Safety and service were suggested as the principal subjects, the results to be judged by three members of the "Panorama" staff—a High School magazine. Prizes were filled token carriers—twelve 7½-cent tokens—four carriers for first, two for second, and one each for honorable mention.

Adverse Economic Factors Keep Portland Receipts Down

W. H. Lines, vice-president in charge of transportation for the Pacific Northwest Public Service Company, Portland, Ore., attributes continued good weather this spring, coupled with the unemployment factor, as responsible for the lack of appreciable revenue increases from the 10-cent fare over 1929 figures, when the 8-cent fare prevailed.

Total receipts for the period, from March 6, when the new fare went into effect, to March 15, inclusive, were $126,802, as compared with $125,660 for the similar ten-day period in 1929 under the 8-cent fare, and $128,823 for the similar ten-day period in 1928.

Receipts for the period from March 16 to March 25, inclusive, were $118,265 under the 10-cent fare, as compared with $117,637 for the similar period in 1929 and $121,841 for similar period in 1928.

Receipts for the period from March 26 to April 4, inclusive, under the 10-cent fare were $124,129, as compared with $124,964 for the similar period last year and $126,473 for the similar period in 1928.

The unemployment factor, Mr. Lines asserted, had been responsible for an 11 per cent decrease in the number of passengers carried during the 8-cent fare period immediately preceding the new 10-cent fare.

Revenues for the March 6-April 4 periods listed total as follows: 1930, $369,196; 1929, $368,261; 1928, $377,137.

◆

Columbia Case Before U.S. Supreme Court on May 2

A motion to advance the hearing of a case from the South Carolina courts dealing with the right of regulatory authorities to compel the operation of railway service at a loss was granted by the U. S. Supreme Court on April 21. The case has been assigned for argument on May 2.

The controversy involves the right of the Columbia Railway, Gas & Electric Company to abandon its railway in Columbia, S. C. Counsel for the railway contends railway service was abandoned because of losses sustained over a period of years. Notwithstanding the losses suffered, the South Carolina authorities sought to compel the continuance of operation.

Railway attorneys carried the case to the Supreme Court on an appeal from a mandamus proceeding instituted by the attorney-general of the state to compel the resumption of operations. The Supreme Court of South Carolina held that the railway service could not be separately abandoned, if the business as a whole is profitable.

The Broad River Power Company, which purchased the gas and electric properties, says the decision of the state court is contrary to the fourteenth amendment to the federal constitution, since it compels the operation of railway service at a loss. Exception also is taken by the company to the admission of evidence by the state court which purports to show that the railway, if properly managed, could be operated in the future at a profit. The company maintains there is no evidence to support this opinion as to future operations.

LATE NEWS

(Continued from Page 288)

Trenton, N. J.—Governor Larson will sign Senator McAllister's bill allowing the Bridgeton & Millville Traction Company to transform itself into a bus line without the consent of the municipalities, but with the approval of the Public Utilities Commission.

◆

New York, N. Y.—The Suburban Transit Engineering Board reports 23,000 more suburban passengers are being brought into Manhattan daily than on corresponding days two years ago. New Jersey contributed 318,100 commuters, Long Island 167,000 and Westchester 95,400.

◆

Trenton, N. J.—The Vollmer bill has failed to pass the Legislature. The bill was intended to repeal the 1929 act, which permitted electric railways to deduct from franchise taxes amounts equal to the fares of police and firemen carried without charge.

◆

Port Chester, N. Y. — Cornelius N. Bliss, New York, has been elected a director of the New York, Westchester & Boston Railway to replace the late Dr. A. T. Hadley, a director of the road for many years.

◆

Denver, Col.—After weeks of advertising, and the passing out of printed slips in the cars, the Denver Tramway rerouted many of its lines on April 1. In some cases only the number was changed, while in other cases both the number and routing was changed. In no case was there any real withdrawal of service. Thirty-four buses are well distributed over new or supplanted routes. Some of the rail lines heretofore always run with cars with two operators, are now on a one-man car basis. Twenty miles of rail route are supplanted with bus service.

◆

Rochester, N. Y. — Upon application of equity receivers for the New York State Railways, Federal Judge Adler has signed an order permitting the renewal of a labor contract between the receivers and the Amalgamated for one year from May 1, 1930.

◆

University City, Mo.—The City Council has voted to prohibit service cars between University City and Clayton, and between the Kingsland-Delmar terminus of the Delmar-Olive Street car line of the St. Louis Public Service Company and the University City High School at Balsom and Jackson Avenues.

◆

Kansas City, Mo. — George Morris, trainman for the Kansas City Public Service Company, has been re-elected by employees to represent them on the board of directors for another year. He is now starting on his third term. He was opposed by Ollie M. Brown of the mechanical department.

◆

Portland, Ore.—Frank H. Ransom, a local lumber man, has been selected by the management, and B. A. Green, attorney, by the union, to act with a third member as a board of arbitration to pass upon differences between the Pacific Northwest Public Service Company and its employees over wages. Other working conditions are acceptable.

◆

Detroit, Mich.—The Municipal Railway will discontinue service to Mt. Clemens on May 1, because patronage is dropping off. Withdrawal of service means giving up the right to use tracks of the Eastern Michigan Railways.

◆

Roanoke, Va.—A 3-cent transfer for those changing from the Vinton Street car to the Blue Ridge Heights bus line has been put into effect by the Roanoke Railway & Electric Company. Both the State Corporation Commission and the Vinton Town Council approved the plan.

◆

Erie, Pa.—The Erie Railways will reconstruct its tracks in Peach Street, from 26th Street south to the city limits, at a cost of $25,000.

◆

Philadelphia, Pa. — Operating of the Broad Street subway for the period from Sept. 1, 1928, to March 1, 1930, is estimated to have decreased earnings of the rest of the Philadelphia Rapid Transit Company system $702,820.

◆

Springfield, Mass.—The new de luxe service from Springfield to Worcester and Boston was started on April 18, with the Springfield Street Railway, the Worcester Consolidated Street Railway and the Boston, Worcester & New York Street Railway co-operating. A schedule of 3½ hours between Springfield and Boston is maintained with a limited number of stops. Three round trips are made daily.

◆

Philadelphia, Pa.—Subway trains were in regular operation on April 20, for the first time, to the South Street terminus of the extension just completed for the Broad Street subway, from City Hall southward. Beginning April 21 six-car trains were run on a three-minute headway at rush hours.

◆

Albany, N. Y.—Governor Roosevelt has vetoed the Thayer bill amending the public service commission law by providing that the attorney-general shall appoint a people's counsel.

Macaulay said:—

Men are never so likely to settle a question rightly as when they discuss it freely.

Go to the

49th A.E.R.A. Convention

at

SAN FRANCISCO

JUNE 23 TO 26, INCLUSIVE

and participate in discussions on vital transportation questions.

THREE SPECIAL TRAINS ARE BEING PROVIDED FOR YOUR CONVENIENCE.

Detroit, Mich.—Members of the Street Railway Commission have set May 1 as the day on which the Detroit Motor Bus Company must quit competing with the cars and coaches of the municipal railway on Jefferson Avenue. The department will assign its route on Vernor highway to the bus company.

◆

New Haven, Conn. — Edmund S. Wolfe, president of the First National Bank, Bridgeport, Conn., has been elected a director of the Connecticut Company to succeed the late Charles G. Sanford.

◆

Springfield, Ohio.—Albert S. Richey, Worcester, Mass., has been retained to study the Springfield city transportation situation and to help the city to solve the problem. From the city's recent advertisements for transportation proposals two bus offers were received. The Springfield Railway, now in receivership, has a franchise which extends to 1938. Through the Cincinnati & Lake Erie Railroad it made an offer some time ago, but the city rejected the proposal as unsatisfactory.

◆

St. Louis, Mo.—Effective on April 16 the average speed of cars on the Laclede Avenue division of the St. Louis Public Service Company was increased to 10.25 m.p.h., through the elimination of several unimportant stops.

◆

New York, N. Y.—Representatives of the Transit Commission, the Noise Abatement Commission and the press on April 24 attended a demonstration of a noise abatement device attached to turnstiles of the Interborough Rapid Transit Company at the Grand Central.

◆

St. Louis, Mo.—The War Department has approved the plans for the construction of the Illinois Terminal Railroad's new western approach to the McKinley Bridge over the Mississippi River between St. Louis, Mo., and Venice, Ill. The addition will connect with the elevated system through the northern part of St. Louis to the new subway under Twelfth Street.

◆

Buffalo, N. Y.—The International Bus Corporation has applied to the Public Service Commission for a certificate for a line from Niagara Square and Niagara Street, Buffalo, the route to be an extension of the Delaware Avenue bus line. City consent was granted on April 14. The same rate of fare and transfer privileges now prevailing on the Delaware Avenue line will apply to the proposed extension.

◆

El Paso, Tex.—The El Paso Electric Company follows the practice of varying the color schemes of its cars and buses in accordance with a popular modern trend. The object is to arouse greater interest in order to sell transportation service more effectively. "Color and contrast" says the company "are essential to the greatest degree of interest. This being true of life itself, it follows that the same rule applies to all contacts, including those made in efforts to secure business."

◆

Holyoke, Mass.—The Holyoke Street Railway will discontinue service on its Pelham line between East Street, Amherst and the terminus at West Pelham, on May 1.

Terms of Settlement of St. Louis Bus Strike

The Peoples' Motor Bus Company, St. Louis, Mo., on April 3 resumed operation of its 184 buses after twenty days of inactivity due to the strike of chauffeurs, conductors and shopmen. Statements issued immediately following the negotiations which resulted in the settlement of the strike, made the basis of an item in ELECTRIC RAILWAY JOURNAL NEWS for April 5, page 59, did not reflect accurately the true basis of that agreement. The really important feature was the agreement of the Amalgamated Association to foster ordinances for the elimination of service cars and for the authorization of a high-class dependable substitute service to be operated by the Peoples' Motor Bus Company, any improvements in wages and working conditions to depend on co-operation with the company towards this objective. On this question the company refused to modify its stand, the only compromise being on the length of the contract.

There was never any question about recognition of the union, because the bus company had been bought by the City Utilities Company for the avowed purpose of co-ordinating its service with that of the railway, and railway employees would not work in co-ordination with a non-union organization. The contract provides, however, that there shall be no discrimination between the union and non-union employees; that employees shall not be influenced to become members of the union other than by friendly solicitation; and that any employee attempting to influence any other employee for or against unionism by annoyance shall be subject to immediate dismissal.

The company agreed to reinstate all men who were out on strike, with the proviso that anyone arrested during the strike and subsequently convicted of assault should forthwith be dismissed.

The contract runs for two years and provides that wages and working conditions shall remain during that period as they were before the strike, unless:

> 1. (a) service car competition shall substantially cease, and (b) the company shall be authorized to operate a de luxe express service at a fare not exceeding 25 cents; or,
>
> 2. (a) service car competition shall substantially cease, and (b) the company's earnings shall be so increased thereby as to warrant an increase in wages.

In the event of either of these two conditions occurring, the union may on thirty days' notice elect to re-open the matter of wages and working conditions. If re-opened and fixed, there shall be no further re-opening until the expiration of the agreement. The wages and working conditions in existence prior to the strike, including the rates for overtime and the allowance of one day a week off without pay if and when operating conditions permit, are set out in detail as a matter of record.

Richard W. Meade, president of the bus company, issued a statement in which he said in part:

> The regretable delay in settling the strike was due solely to the unwillingness of the union to adhere to the basis on which negotiations were originally opened; namely, that our existing scale and working conditions must continue until the unfair service car competition had been eliminated and the company authorized to operate a new class of service in substitution for it, thereby providing additional earnings necessary before increased wages could be paid.
>
> We insisted upon a contract that embodied our existing wages and working conditions, so that there should be no dispute about them, and in placing these conditions on record we went out of our way to be liberal in construing practices that had been subject to some variation.
>
> During the conferences for the settlement of the strike it was very clearly demonstrated that, beyond the natural desire of our employees to secure the exceedingly liberal wages and time allowances enjoyed by the employees of the St. Louis Public Service Company doing similar work, there was little or no discontent among our men.
>
> The strike being settled and all differences adjusted, we now want to give the maximum of good service to the people of St. Louis and to extend our system in a new field where it can supplant the irregular and irresponsible mediums that have grown up like Topsy because provision never has been made for a real scheduled, dependable service of rapid mass transportation.

◆

Indiana Commission Rejects Merger Proposal

Receivership for T. H. I. & E. and Indianapolis Street Railway Follows Disapproval of $70,000,000 Insull Utility Consolidation Petition

THE proposed $70,000,000 merger of the Insull-controlled Central Indiana Power Company properties with the Terre Haute, Indianapolis & Eastern Traction Company has been denied by the Public Service Commission of Indiana on the grounds that the merger was based on an unsound financial set up and that it would not serve the public interest.

Coincident with the rejection of the merger petition, insolvency suits were filed in two courts by the Westinghouse Electric & Manufacturing Company against the Terre Haute, Indianapolis & Eastern Traction Company and its subsidiary, the Indianapolis Street Railway. George C. Forrey, Jr., president of the Fletcher American Company, Indianapolis, was appointed receiver of the local railway by Judge Chamberlain of the Marion Circuit Court.

Action against the T.H.I. & E., was dismissed when the company sent a check to the Westinghouse company in settlement of the claim. A new receivership suit against the T.H.I. & E. was then filed in the Superior Court by the Consolidated Collieries Company, Indianapolis. Following the hearing on this petition, Elmer W. Stout, Indianapolis, was made receiver by Judge Milner.

The receivership suits were not unexpected in view of evidence presented during the merger hearings that the T.H.I. & E. had borrowed more than $2,000,000 in short term loans on the hope that the merger, if approved, would provide a way out of its financial straits. While The Indianapolis Street Railway was not involved in the merger proposal, its common stock is owned by the T.H.I. & E. and the improvement of the parent company would have helped the subsidiary.

The insolvency proceedings are expected to result in the reorganization of the two properties and the probable abandonment of several weak and losing divisions of the T.H.I. & E. The merger was proposed as a solution of these difficulties, but when it was denied, receivership proceedings were adopted as the only logical course of conserving assets, protecting creditors and providing an orderly procedure for reorganization.

It has been estimated that $7,000,000 of new capital will be needed to modernize the Indianapolis Street Railway, provide new cars and rebuild track.

In denying the petition the commission held the expected earnings were not sufficient to support the projected capitalization and that there was no adequate assurance of increased earnings to improve the financial situation of the consolidation.

"Anticipation of a substantial improvement in the net earnings of the consolidated properties for the future is a matter involving too much speculation and uncertainty for sound financing of utility property," the commission declared.

Plans for the merger first were announced in 1925 by Samuel Insull of Chicago and the late J. Randal Morgan of Philadelphia. A merger contract was approved in the summer of 1928, however, and the petition was filed Aug. 27 of that year. The first hearing, for organization, was held Oct. 9, 1928. Taking of testimony was begun on Dec. 2, 1929, and was adjourned on Dec. 10 until March 16. The hearings were concluded March 21. From the standpoints of time consumed in reaching a decision, mass of evidence presented and scope of properties involved, it was the largest case in the history of the Indiana commission.

◆

Chicago Franchise

(Continued from Page 288)

Although reference to a merger of the surface and elevated lines with the Chicago Motor Coach Company was omitted from the franchise, the text neither permits nor prohibits this.

The powers of the transit trustee who will take over the city's $61,000,000 car fund and receive and disburse the city's compensation of 3 per cent of the gross annual receipts of the new company have been defined. The ordinance as now written provides that he shall not be empowered to buy city tax anticipation warrants. His investment of the transit fund must be in city, county, state and federal bonds or in securities acceptable at the federal reserve bank for rediscount, according to one of the conferees.

Plans for the subways have not yet been completed. Another month will be required before the drafting of the special assessment features of the subway ordinance will be finished. After this a public hearing must be held to conform to the statutes, the assessments spread and a confirmation of the plan obtained from the courts.

The work on the financial plan for the consolidation of the surface and elevated lines is yet to be finished, but Frank O. Wetmore, leader of the group of financiers, predicted that, with the ordinance out of the way, negotiations with the various bondholders' protective committees, will be resumed and the financial agreement will be reached without further delay.

Accident Figures Reported by 171 Interstate Lines

The Interstate Commerce Commission has compiled a report on accidents occurring in interstate electric railway operations during 1929 based on returns from the 171 carriers under the commission's jurisdiction. A report on casualties on interstate electric lines formerly was included in the commission's annual accident bulletins, but this was abandoned a number of years ago. The request that the electric carriers furnish such information for 1929 is the result of a demand for bringing together all information that may have any bearing on the subject of street and highway safety.

The number of car-miles traveled by interstate electric carriers last year totalled 256,849,500. Casualties per 1,000,000 car-miles averaged 1.45 persons killed and 11.95 persons injured. In a total of 2,675 train and train service accidents, 373 persons were killed and 3,070 injured. Collisions with automobiles at highway grade crossings constituted the principal cause. They numbered 617 and resulted in the death of 175 persons and the injury of 832. Collisions with persons at highway grade crossings numbered 218 and resulted in the death of 80 persons, 59 of whom were pedestrians, and the injury of 141. Collisions with automobiles not at highway grade crossings ranked third in the number of resulting fatalities. In 231 accidents of this kind, 50 people were killed and 295 persons were injured. The 225 persons killed in collisions with automobiles were the occupants of the automobiles. Collisions with persons elsewhere than at highway grade crossings numbered 97, killing 24, 22 of whom were pedestrians.

Collisions with other electric cars numbered 69, with four killed and 216 injured. Seven collisions with steam trains killed two and injured sixteen. Collisions with other vehicles numbered 15, resulting in 4 deaths and the injury of 15 persons.

Only seven passengers carried by the interstate electric railways last year were killed; five in boarding or alighting, an average of .03 per 1,000,000 car-miles. The number of passengers injured was 1,346; 702 in boarding or alighting, an average of 5.24 per 1,000,000 car-miles. Casualties among employees on duty numbered 24 killed and 425 injured. Fifty derailments resulted in the death of three persons, two of whom were employees and one the occupant of an automobile. Sudden stopping, starting or lurching resulted in the injury of 135 persons, 126 of whom were passengers, and nine trainmen.

Non-train accidents numbered 2,207, and caused the death of sixteen and the injury of 2,198 persons.

◆

Evansville, Ind.—Fire on April 1 destroyed the substation on the Boonville, Ind., division of the Evansville, Suburban & Newburgh Railway, located 8 miles east of Evansville.

Conspectus of Indexes for April, 1930

Compiled for Publication in Electric Railway Journal by

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	Latest	Month Ago	Year Ago	Last Five Years	
				High	Low
Street Railway Fares* 1913 = 4.84	April, 1930 **7.91**	Mar., 1930 **7.88**	April, 1929 **7.75**	April, 1930 **7.91**	April, 1925 **7.26**
Electric Railway Materials* 1913 = 100	April, 1930 **140.2**	Mar., 1930 **141.6**	April, 1929 **145.0**	Dec., 1926 **159.2**	Feb., 1928 **139.5**
Electric Railway Wages* 1913 = 100	April, 1930 **231.7**	Mar., 1930 **231.7**	April, 1929 **230.1**	Feb., 1930 **231.7**	April, 1925 **221.6**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	April, 1930 **203.0**	Mar., 1930 **203.0**	April, 1929 **200.9**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	April, 1930 **207.1**	Mar., 1930 **206.8**	April, 1929 **203.4**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Mar., 1930 **90.8**	Feb., 1930 **92.1**	Mar., 1929 **97.5**	Nov., 1925 **104.5**	Mar., 1930 **90.8**
Wholesale Commodities Bradstreet 1913 = 9.21	April, 1930 **11.18**	Mar., 1930 **11.22**	April, 1929 **12.87**	Dec., 1925 **14.41**	April, 1930 **11.18**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Mar., 1930 **150.1**	Feb., 1930 **153.0**	Mar., 1929 **153.0**	Nov., 1925 **167.1**	Mar., 1930 **150.1**
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Mar., 1930 **157.4**	Feb., 1930 **158.8**	Mar., 1929 **159.8**	Nov., 1925 **171.8**	Mar., 1930 **157.4**
Industrial Activity Elec. World, kw.-hr. used 1913-25 = 100	Mar., 1930 **125.0**	Feb., 1930 **123.5**	Mar., 1929 **135.7**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	Mar., 1930 **94.3**	Feb., 1930 **96.5**	Mar., 1929 **103.9**	Oct., 1929 **111.8**	Nov., 1926 **94.0**
Business Failures Number Liabilities, Millions of Dollars	Mar., 1930 2093 **73.82**	Feb., 1930 2150 **69.13**	Mar., 1929 1704 **36.42**	July, 1929 1581 **102.09**	Sept., 1928 1348 **23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Work on New Portland Ordinance to Start

An ordinance has been passed by the City Council of Portland, Ore., providing for retention of Carey & Harlan, consulting engineers, to appraise the railway property and prepare a service-at-cost franchise. The stated consideration for this work is $18,000.

The franchise is to be drawn in collaboration with the city attorney. It must be ready for submission to the voters in the general election in November. Chief among contemplated changes are that the Portland Electric Power Company be relieved of various imposts such as bridge tolls, franchise tax and possibly others.

One councilman offered as a counter proposal that the city call for bids to supply mass transportation by street car, trackless trolley or buses, or a combination of all three. Carey & Harlan will report on this proposal.

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Increased Operating Allowance Before Cleveland Council

The Cleveland Railway on April 21 made public its executive officers' payroll in deference to requests by members of the City Council who are considering the increase in the company's operating allowance from 29 to 31 cents a car-mile. The president receives $42,500 a year; one vice-president $22,000; another vice-president and the assistant to the president, $17,500 each. The company's chief surgeon is paid $11,000, while salaries of $10,800 each go to superintendent of stores and materials, treasurer, superintendent of the accident department, civil engineer, superintendent of personnel, and superintendent of buildings and equipment.

The auditor and three other superintendents receive $9,600 each and three other executives $8,400 each. Salaries of fourteen others range from $6,600 to $4,200. The annual payroll of executives is $308,400.

In making public the payroll, President Alexander declared that it represented only a fraction of the cost of operating the company and that the City Council itself controls operating costs to a large degree by reason of its control of the service. He says that if the operating allowance is not increased the railway would have to cease insurance and pension payments for employees or reduce wages, or both.

Competition between the Hanna Building Company and the Midland Bank Building for the privilege of housing the offices of the Cleveland Railway continues to grow in intensity. The Hanna Building has offered the same amount of space as the Midland Bank Building offered at a reduction of $45,000 a year in the rent now paid. The Midland building is in the Van Sweringens' Terminal group.

In the midst of the councilmanic flurry the railway received word from Washington that the United States Supreme Court had refused to review its appeal from the decision of the lower courts holding that federal income taxes can be levied on the company's interest fund.

PERSONAL MENTION

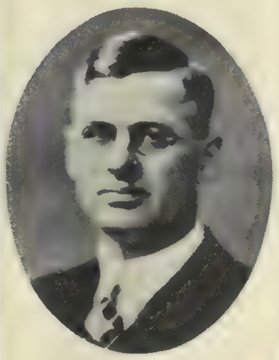
Messrs. Palk, Blodgett and Dahl Made Vice-Presidents

Winnipeg Officials Advanced in Recognition of Their Long and Valuable Services, Publicly Proclaimed by President Anderson

AT THE annual meeting of shareholders of Winnipeg Electric Company, Winnipeg, Man., held on April 7, Lawrence Palk, W. E. Blodgett and C. H. Dahl were elected vice-presidents of the company. Mr. Palk is now vice-president in charge of executive matters, Mr. Blodgett is vice-president in charge of finances and accounting, and Mr. Dahl is vice-president in charge of operation. Each was formerly head of the particular department named. Mr. Blodgett was comptroller of Winnipeg Electric Company. He is also treasurer of Manitoba Power Company, Ltd., and of Northwestern Power Company, Ltd., associated companies, and Mr. Palk is also secretary of Winnipeg Electric and associated companies.

L. F. B. Palk

W. E. Blodgett


C. H. Dahl

In speaking of the new appointments, President Anderson said:

> I am glad to be able to announce that at the organization meeting of the board of directors the following executive appointments were made: W. E. Blodgett, vice-president in charge of finances and accounting; C. H. Dahl, vice-president in charge of operation; Lawrence Palk, vice-president in charge of executive matters.
>
> Mr. Blodgett has been the company's comptroller for some years. Mr. Dahl has been assistant general manager in charge of operation, and Mr. Palk has been assistant general manager in charge of executive matters, and in recognition of their long and valuable services rendered to the company their appointments with these titles were confirmed at the above-mentioned meeting.

Lawrence Frederick Betts Palk formerly was secretary and assistant general manager in charge of executive matters of Winnipeg Electric Company, Manitoba Power Company, Ltd., and Northwestern Power Company, Ltd. Mr. Palk was born in Winnipeg on Aug. 14, 1885. He commenced his career as a stenographer for the Winnipeg Electric Company in October, 1904. He was made secretary, secretary and assistant to president, assistant general manager in charge of executive matters and finally vice-president in charge of executive matters. He is also secretary of Winnipeg Electric and associated companies. He is a member of many societies in Winnipeg.

For a number of years Charles Henry Dahl has been assistant general manager in charge of operation. The Winnipeg Electric Company is the parent company of Manitoba Power Company, Ltd., and Northwestern Power Company, Ltd., which operate electric railway, light, power and gas utilities in Manitoba. Mr. Dahl was born in Appleton, Minn., on Feb. 12, 1888. He was educated at Marinette high school, Marinette, Wis., and Oshkosh Teacher's College. He is a B.A. of Wisconsin University. He went to Canada in November, 1919, and started with the Winnipeg Electric Company as statistician. In that capacity he familiarized himself with the operations of the various utilities to such an extent that he was rapidly promoted. He was president of the Winnipeg Lions Club in 1926 and 1927, and in 1929 was elected president of the Canadian Electric Railway Association.

William E. Blodgett, comptroller of Winnipeg Electric Company and treasurer of the Manitoba Power Company, Ltd., and the Northwestern Power Company, Ltd., has had long experience with public utilities. Previous to his start with the Winnipeg Electric Company in September, 1920, he was secretary-treasurer of the Utah Light & Traction Company. Mr. Blodgett is a native of Wisconsin and learned accounting in business institutions of Wisconsin and Minnesota. He was accountant for the Twin City Rapid Transit Company when he accepted a position with the Utah Light & Traction Company. He filled the positions of paymaster, statistician, chief clerk, assistant secretary and chief clerk to the general manager. In 1914 when the Utah Light & Railway Company was consolidated with the Salt Lake Light & Traction Company he continued as chief clerk to the manager of the new company, and in 1916 he was elected secretary and treasurer and was placed in charge of the accounting department. He held that position until his appointment as comptroller of the Winnipeg Electric Company.

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W. F. Miller Made Comptroller at Spokane

W. F. Miller, who has been auditor of the Washington Water Power Company, Spokane, Wash., for several years, has been elected comptroller. In his new position the duties of auditor will be merged with those of comptroller, calling for closer contact with the financial affairs of the company, in addition to the regular departmental accounting.

L. E. Morse, formerly secretary and assistant treasurer, has been elected secretary-treasurer.

The Washington Water Power Company controls the Spokane United Railways.

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R. M. Feustel Heads South Shore

Robert M. Feustel has been elected president of the Chicago, South Shore & South Bend Railroad, and Samuel Insull, Jr., has been elected chairman of the executive committee. Samuel Insull is chairman of the company, and the vice-presidents include William A. Sauer, Charles W. Chase, Morse DellPlain and Ralph H. James.

The members of the newly created executive committee are: Samuel Insull, Samuel Insull, Jr., Robert M. Feustel, Britton I. Budd, Bernard J. Fallon, Charles E. Thompson, and Hal M. Lytle.

The stockholders of the company voted at the annual meeting to increase the number of directors from nine to thirteen. Samuel Insull, Jr., Hal M. Lytle, E. Van Arsdel, and L. B. Andrus were elected new directors.

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Engineers Complete Boston-Worcester Rehabilitation

Cyrus B. Buchanan and Jerome Rich of the Buchanan & Lang Company, have concluded their connection with the Boston, Worcester & New York Street Railway. Mr. Buchanan went to Framingham after the receivership of the railway to take charge of its reorganization. Under his direction many changes and improvements were brought about. The entire roadbed between Boston and Worcester has been improved, obsolete equipment and property done away with, and new service started, not only on the original line but through the establishment of a bus service on the Post road from Boston to Worcester and New York. Messrs. Buchanan and Rich leave to undertake other work for the company which they represent.

N. J. Scott Heads New England Operators

In some respects N. J. Scott, the new president of the New England Street Railway Club, is a law unto himself as manager of the Connecticut Company at Hartford. True, that city is only one of the many in which the company operates, but it is one of the most important, if not really the most important. Let others contest that point.

Mr. Scott is known far and wide in his community and favorably, too. The Hartford division is largely Mr. Scott and Mr. Scott, with due respect to others, is largely the Hartford division. If by chance one address him by letter, back comes a reply on company paper, and the sole name on it is N. J. Scott, manager. That's the recognition Mr. Scott gets from his company. It is well deserved.

If Mr. Scott were politically ambitious he could probably be mayor, unless perchance to attain that office one must be a native of Hartford County. That would let Mr. Scott out. But to all intents and purposes he is a native. Hartford beckoned to Mr. Scott when he was twenty years old. He acknowledged the salute by entering the employ of the Hartford Street Railway as a conductor. That was in July, 1896. This he did after he was graduated from the Knowlton High School. He was born and educated in Canada.

A mathematician would discover that was 34 years ago, but Mr. Scott has not stopped to count the years. He has been too busy to ruminate much, too busy serving successively as carhouse foreman, dispatcher, superintendent of transportation and, lastly but not finally, as manager of the Connecticut Company, Hartford division, the successor to the Hartford Street Railway. Incidentally he has established himself firmly in the hearts of all the men and women of the division by his warm human understanding, and now his associates in the industry in New England have publicly acknowledged their appreciation of the man by electing him to the highest office within their power to bestow.

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H. S. Whiton in New Byllesby Post

Herbert S. Whiton has been appointed acting chief mechanical engineer of the Byllesby Engineering & Management Corporation, to succeed H. Boyd Brydon, who resigned on March 15.

Mr. Whiton received the degree of Bachelor of Science in Mechanical Engineering from Harvard University in 1901. Early in 1905, he entered the employ of Stone & Webster as chief engineer of the power station of the Ponce Railway & Light Company at Ponce, Porto Rico. At the end of about two years he was made manager of the company and in July, 1909, he was transferred to the Minneapolis General Electric Company as superintendent of power. In June, 1923, he was transferred to the Chicago office of Byllesby Engineering & Management Corporation.

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M. C. Burritt Named to New York Commission

Maurice C. Burritt of Hilton, Monroe County, N. Y., has been confirmed as a member of the Public Service Commission to succeed Commissioner William R. Pooley of Buffalo, whose term expired more than a year ago. Mr. Burritt is a Republican. Colonel Pooley has held over in office more than a year. This has been due to the fact that last year's Senate adjourned without confirming the Governor's appointment of Davis C. Adie, Buffalo Democrat, to the commission. Mr. Burritt was formerly the head of the extension service of Cornell University; in addition, he was vice-dean of the New York State Agricultural College, and has been the treasurer of the G. L. F. Exchange, having charge of the finances of this very large business organization. Furthermore, he has been president of the New York State Horticultural Society, and for the past year and a half has served as a member of the Governor's agricultural advisory commission.

Messrs. Hutcheson and Thornton in New Offices in Montreal

Lieut.-Col. J. E. Hutcheson

J. E. Hutcheson, vice-president of the Montreal Tramways, Montreal, Que., was named managing director, and Kenneth B. Thornton, formerly assistant general manager, made general manager at a meeting of the board of directors which followed the annual general meeting of the shareholders. Julian C. Smith, president, who has held the office of managing director has relinquished that office.

Intimation that the company was working on plans for an underground railway for Montreal, was offered by Mr. Smith during the course of his supplementary remarks. The company, he said, was very much alive to the transportation needs of the city, and had been investigating the possibilities of an underground system.

K. B. Thornton

Lieut.-Col. Hutcheson began his business career as a telegraph operator with the Grand Trunk Railway in Brockville in 1878 and six years later was appointed trainmaster, a position he held for six years, to 1890, when he became manager of the Ottawa Electric Railway. In 1912 he went to Montreal as general manager of the Montreal Tramways, and in 1924 was appointed vice-president and general manager.

Mr. Thornton was formerly general manager of the Canadian Light & Power Company; Quebec & New England Hydro-Electric Corporation, and consulting engineer to the Montreal Tramways. He was connected with the Montreal Light, Heat & Power Company from 1893 to 1904, when he joined J. G. White & Company, of New York and London. Upon severing his connection with the latter firm in 1911 he became associated with the Montreal Tramways.

Montreal Tramways is a subsidiary of Consolidated Securities, Ltd., which in turn is controlled by United Securities, Ltd., a company jointly controlled by Shawinigan Water & Power Company and Montreal Light, Heat & Power Consolidated. Incorporated in 1911, the company serves the city of Montreal and suburbs. It has a contract with the city of Montreal which runs to 1953, when the property may be purchased by the city or the contract is automatically extended for five-year periods.

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Officers Elected for Calumet Railways

Directors of the citizen-owned Calumet Railways, Inc., have elected Samuel Insull, Jr., Chicago, as chairman of the board and Morse DellPlain, head of the Northern Indiana Public Service Company, as president of the organization formed to rehabilitate the former Hammond, Whiting & East Chicago Railway. The other officers include:

Walter J. Riley, banker, East Chicago, vice-president; Henry P. Conkey, head of the Conkey Printing Company, Hammond, secretary; Walter E. Schrage, president of the Bank of Whiting and former Mayor of Whiting, Ind., treasurer; John C. Horn, president of the Washington Lumber Company, East Chicago, auditor; D. H. Mitchell, Hammond, comptroller and assistant treasurer, and D. O. Schrader, Hammond, assistant secretary.

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Charles E. Thornton, Bronxville, N. Y., has been appointed senior assistant utilities engineer of the Maryland Public Service Commission, Baltimore. He succeeds Edgar R. Shepperd, now with the Bureau of Standards.

D. E. Watson Heads City and Interurban Systems

David E. Watson, elected recently to the presidency of the Terre Haute, Indianapolis & Eastern Traction Company, has been acting president of that company and the Indianapolis Street Railway, Indianapolis, Ind., since May, 1929, when he assumed the duties of the late Robert I. Todd.

Mr. Watson became connected with the Terre Haute, Indianapolis & Eastern Traction Company in 1911 as local attorney at Martinsville, Ind. In June, 1929, he was transferred to the legal department of the company at Indianapolis, where he served as trial lawyer for more than ten years. He was appointed general attorney of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis Street Railway, and power and light company subsidiaries in 1923 and has represented these companies in all cases before the state Public Service Commission since that time. In addition to his duties as president he will continue in charge of all general corporation work for these properties.

D. E. Watson

Mr. Watson was born in Cloverdale, Indiana. After he was graduated from the law school of DePauw University at Greencastle in 1896, he went to Martinsville and started a law practice. During the memorable presidential campaign of William Jennings Bryan in 1896, he attained considerable local repute as a public speaker. While a member of a successful law partnership in Martinsville, he was elected, several years later, to the office of public prosecutor of Morgan County.

Mr. Watson has been in charge of the legal interests of the Terre Haute, Indianapolis & Eastern Traction Company and subsidiary companies in the proposed merger of these companies with the Central Indiana Power Company operating subsidiaries, now before the Indiana Public Service Commission.

He is a member of the Marion County, Indiana and American Bar Associations and of several leading clubs in Indianapolis.

◆

Carl D. Henry, Sherman, Tex., has been appointed commercial agent for the Texas Electric Railway, with headquarters at Sherman. He succeeds Compton A. Huguely, who at his own request was made freight and passenger agent for the same line at Sherman, succeeding V. E. Jones, resigned. Mr. Henry is a former employee of the Missouri-Kansas-Texas Railroad, having been with the railroad in Sherman for several years. Later he was chief clerk to the division freight agent of the steam railroad at Waco. He resigned the latter position to accept a place with the Texas Electric Railway.

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A. E. Ferguson Vice-President of National Creosoting Company

Joshua S. Logan, president of the National Lumber & Creosoting Company, Texarkana, Ark.-Tex., announces the election of Albert E. Ferguson as vice-president and member of the board of directors of that company. Mr. Ferguson will maintain offices at the general offices of the company at Texarkana, Ark., and also at St. Louis, Mo. Mr. Ferguson is a graduate of Washburn College, Topeka, Kan., and holds a commission as captain of Field Artillery Reserves, United States Army. In 1920 he entered sales work as an associate of John J. O'Fallon with whom he was prominently identified for several years. Prior to his election to the position of vice-president of the National Lumber & Creosoting Company, Mr. Ferguson held the position of general sales manager of the company.

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William A. Prendergast, who recently resigned as chairman of the Public Service Commission of New York, has become a general partner of the banking and brokerage firm of W. C. Langley & Company, specialists in public utility securities. Mr. Prendergast has had wide business and financial experience. From 1899 to 1904 he was secretary-treasurer of the National Association of Credit Men. He is a well-known writer on business subjects.

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Arthur L. Rae, for the past three years assistant comptroller of the American Water Works & Electric Company, has succeeded A. A. Adams as comptroller. Mr. Rae was born in Holyoke, Mass., on March 17, 1891; graduated from Williams College in 1911 with a year of graduate work in the Harvard School of Business Administration. Mr. Rae's early experience with the American Telephone & Telegraph Company has given him a broad training in public utility work, but his later connections enabled him to obtain a more generalized knowledge of financial affairs and business administration.

◆

C. P. Couch has resigned as vice-president and general manager of Southern Ice & Utilities Company, at Dallas, Tex., to become vice-president in charge of operations of the Louisiana & Arkansas Railway at Shreveport, La. Mr. Couch formerly was vice-president and general manager of the Mississippi Power & Light Company, at Jackson. While in this position he developed an interconnected system supplying electric power to more than 100 cities and towns of Mississippi hitherto dependent upon isolated plants of small capacity, including many municipally-owned and operated light plants purchased by the Mississippi Power & Light Company. In association with his brother, H. C. Couch, he had a large part in developing the interconnected power systems of the present Louisiana, Arkansas & Mississippi Power & Light Companies.

"Neb" Grover Succeeds the Late C. A. Kincade

"Neb" Grover has been appointed to succeed the late C. A. Kincade as superintendent of electrical distribution of the Kansas City Public Service Company, Kansas City, Mo. Mr. Grover became connected with the Kansas City organization in 1916. This was immediately after he had finished high school, so the whole of his business life has been devoted to the Kansas City Public Service Company. First, he served in the capacity of a lineman, then as substation operator, a wireman, a light and telephone repairman, and electric switch inspector, and, in fact, nearly every job in the department. In 1918, he became assistant to Mr. Kincade, serving for a time as general foreman of all maintenance work in the department and later became supervisor of overhead line.

His actual experience in nearly every job in the department has fitted him especially for his new position as department head. He first came officially before the public in a 1916 issue of the *Railwayan*, company house organ, in a poem entitled, "When the Smokestack Smokes at 8th and Woodland."

"Neb" Grover

"Neb's" father, Charles Grover, occupied a similar position 30 years ago. Under his father's direction, the change was made from cable to trolley lines and much of the overhead and underground system was built. Another coincidence is that Charlie Grover, Jr., at present occupies a position similar to "Neb" with the Kansas City Power & Light Company.

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J. R. Lotz, Stone & Webster Construction Manager

J. R. Lotz has been appointed senior construction manager of the Stone & Webster Engineering Corporation. Mr. Lotz was educated at the University of Illinois and, after six years in railroad work on the Lackawanna and the Chicago & Joliet systems, joined the Stone & Webster organization in Seattle building construction activities. In 1912 he was transferred to Boston as assistant construction manager and had charge of construction on many large industrial plant projects and educational buildings. In 1919 he was appointed a construction manager and in 1928 became a vice-president of the Stone & Webster Engineering Corporation.

A. H. Wood Takes Up Commercial Department Duties

A. H. Wood, appointed to succeed "Bert" Sanders in charge of the commercial department of the Kansas City Public Service Company, Kansas City, Mo., has entered upon his new duties with all the enthusiasm characteristic of the man. True, Mr. Wood is very young, but no man undergoes the strenuous course of training which he completed so successfully as a cadet engineer in utility work unless he is a born "doer," or the seeds of the "doer" are firmly planted in him.

That he happens to be the son of an illustrious father has in no way militated against Mr. Wood. He would have to go far to outstrip his father, but certainly young Wood is headed in the right direction. His work with the Public Service Corporation of New Jersey and with Barron Collier, Inc., New York, was exacting, but it has taught him how to walk among kings and not lose his head.

Mr. Wood knows. He put in time on the front end of a trolley car, behind the wheel of a bus, in the receiver's cage, on the line gang truck, at tamping ties, road checking, inspection work, overhauling motors in the pits, in the supervisor's office and in the traffic and time-tables departments on the New Jersey system.

A. H. Wood

To him the many little duties handled in the commercial department at Kansas City are more of a hobby than a job. He gets real pleasure out of this work, but of all he expects most to enjoy the editing and publishing of the *Railwayan*, official publication of the company at Kansas City. He is at all times a close observer, and incognito he has been riding the Kansas City railway and bus lines familiarizing himself at first hand with the service, the public's need and the reactions of the riders. He has been more than favorably impressed, and he has not failed publicly to acknowledge his enthusiasm to the personnel.

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North Shore Has New Assistant General Manager

Samuel A. Morrison has assumed his duties as assistant general manager of the Chicago, North Shore & Milwaukee Railroad, with offices at Highwood, Ill. At the time of his appointment to this new post, Mr. Morrison was serving as assistant general superintendent of the South Shore Line.

Mr. Morrison brings to the "Road of Service," as the high-speed interurban line between Chicago and Milwaukee is known, a wealth of railroad experience, having devoted his entire life to the transportation industry. He started his career as an operator on the Chicago & North Western Railroad in 1899, working his way up through various stages of promotion until he was made a division superintendent in 1918. During the eight years he served in this capacity he worked on seven different divisions of this railroad.

S. A. Morrison

Joining the Chicago, South Shore & South Bend interurban line in October, 1927, Mr. Morrison served as superintendent of freight service for one year, his ability winning him promotion to the post which he was holding at the time of his joining the North Shore Line.

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A. A. Adams, comptroller of the American Water Works & Electric Company, Inc., since 1920, has retired from active business. Mr. Adams has been in the employ of the company for 28 years. He was born in Pittsburgh on Sept. 2, 1884, and received his schooling and early business education there. In 1914, when the home office of the American moved to New York, Mr. Adams went there, but now will return to the city of his birth.

◆

Vine W. Burley, general manager of the Triple Cities Traction Company, Binghamton, N. Y., and former commissioner of public works there, has been named by Mayor Norman A. Boyd as a member of the board of managers of the Binghamton City Hospital, to fill the vacancy caused by the expiration of the term of Mrs. Renna Z. Spaulding. Large construction projects are ahead for the hospital and the Mayor said in appointing Mr. Burley he felt it highly desirable to place on the board one, who by reason of previous experience and judgment in construction, would not only be able to offer advice to the other members but who would be capable of valuable assistance of a supervisory character.

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J. A. Horner has been made assistant comptroller of the British Columbia Electric Railway, at Vancouver, B. C. Mr. Horner has been in the service of the company since 1908. From that time until 1918, he was employed as a clerk in the comptroller's department. On Feb. 1, 1918, he was promoted to accountant in this department, and now becomes assistant comptroller of this vast system.

Dr. Otto Gressens With Chicago "L" and Interurban

Dr. Otto Gressens has assumed his duties as assistant to Britton I. Budd, president of the Chicago Rapid Transit Company, operating the elevated lines in Chicago, and the Chicago, North Shore & Milwaukee Railroad, operating between Chicago and Milwaukee, a position to which he was appointed on March 5.

Previous to joining these two companies, Dr. Gressens was assistant to the president of the Public Service Company of Northern Illinois, operating a vast network of power lines serving the Chicago suburban district for light and power, and this position he still holds in addition to his new duties. He entered the employ of the Public Service Company in September, 1927, being assigned to the office of George R. Jones, vice-president. On Sept. 26, 1929, Dr. Gressens was transferred to Mr. Budd's office and appointed assistant to the president.

Dr. Otto Gressens

Before becoming affiliated with the Public Service Company, Dr. Gressens was chief statistician with the bureau of business research of the University of Illinois. Dr. Gressens was born in Sterling, Ill., and was graduated from the University of Illinois with the class of 1921.

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His Former Associates Honor "Bert" Sanders

Before he left Kansas City, Mo., to take up his new work as head of the branch office of the Barrows Advertising Agency at Cleveland, Ohio, E. B. (Bert) Sanders was royally fêted and banqueted at the Kansas City Athletic Club by officers of the Kansas City Public Service Company and other friends, and was presented with a handsome traveling bag as a token of friendship and esteem.

There is more to the story about Bert Sanders than was contained in the brief item about him in ELECTRIC RAILWAY JOURNAL for April. "Bert" went to the Kansas City Public Service Company just ten years ago, in 1920, to take over the publicity and advertising work as manager of the commercial department. Prior to that, he was associated with the Wichita Beacon of Wichita, Kan. as sports editor. This is the paper which became so well known under the direction of Henry Allen.

Not only did "Bert" excel in advertising and journalistic work, but broadened his training through the study of law. He attended and graduated from the Kansas City School of Law. In 1920 he passed the bar examination and became a full-fledged attorney. He was born in Washington, D. C., went out to Amarillo, Texas, spent some time in Colorado, Kansas and Missouri, and now has gone back east to Ohio.

In line with his work in the commercial department at Kansas City, "Bert" probably knew and was known by more employees and townspeople than most any other member of the company. By his work in all its various branches at Kansas City "Bert" Sanders made a national name for himself in public relations and publicity work among the utilities.

OBITUARY

Nicholas F. Brady

Nicholas F. Brady, chairman of the board of the New York Edison Company and director of half a hundred corporations, died on March 27. He had been ill since last September of arthritis. He was 51 years old.

A modest man, Mr. Brady kept himself in the background whenever possible. Nevertheless he was a man of strong convictions and striking initiative and courage. He was thoroughly trained from early manhood in large affairs, and was clear-visioned and straight-thinking. He was intensely loyal to his friends and business associates, and was generally respected, admired and loved.

N. F. Brady

The humanitarism of the man was best reflected by his work with the National Civic Federation and in connection with the so-called Brady awards, a great stimulant to careful operation in the electric railway industry. These awards were established in 1914 by the family of the late Anthony N. Brady, but were revived in 1927 largely through the good offices of Nicholas Brady himself after having been allowed to lapse during the war-time period.

Nicholas Frederic Brady was a son of the traction and public utilties magnate, Anthony N. Brady, who died some fifteen years ago leaving an enormous fortune. He was a brother of James Cox Brady, who died suddenly a year ago. Nicholas Brady was born at Albany, N. Y. He received a preliminary education in Albany and attended the Albany Academy until 1895. He then entered Yale and was graduated with the class of 1899. He began his business training immediately after he left the university and within a few years occupied an important place in the councils of the New York Edison Company, becoming its vice-president, and then, on the retirement in 1913 of Anthony N. Brady, its president.

Mr. Brady was chairman of the board of the New York Edison Company and dominated also the Consolidated Gas Company and various other important enterprises including the Brooklyn Rapid Transit Company, the United Electric Light & Power Company, the Brooklyn Edison Company, the Consolidated Telegraphical & Electrical Subway Company, the United States Cast Iron Pipe & Foundry Company and the Yonkers Electric Light Company.

◆

Dr. Thomas Addison

Dr. Thomas Addison, who served for 31 years as Pacific Coast manager of the General Electric Company, with headquarters in San Francisco, until his retirement in 1923, died suddenly in Berkeley, Cal., on April 8, at the age of 76. Educated originally as a physician, Dr. Addison was graduated from Bellevue Medical College, New York, in 1877, but after eight years gave up his practice to enter the employ of the United States Electric Company of Chicago. In 1888 he became an apparatus salesman for the Thomson-Houston Company in Chicago, and when in 1890 the Western branch of the company was reorganized, he was sent to San Francisco as local manager. Two years later he became Pacific Coast manager of the General Electric Company. When Dr. Addison went to the Pacific Coast the first electric railway of California was under construction at San Jose, and he had charge of the installation of the Thomson-Houston equipment.

After 33 years of distinguished service, Dr. Addison retired on Sept. 1, 1923. So intimately had he been connected with the electrical development of the Pacific Coast that his name will stand close to the top of the list of those pioneers whose efforts laid the foundation of the electrical industry.

◆

J. F. Sullivan

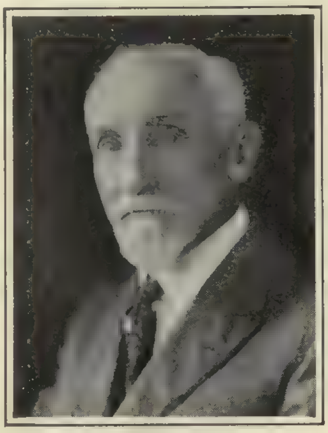
James F. Sullivan, industrial leader, financier and art patron of Philadelphia, is dead. Born in County Cork, Ireland, eighty-four years ago, Mr. Sullivan came to the United States with his brother, the late Jeremiah Sullivan, at the age of 14 years. For forty years they were associated in a wholesale dry goods business before entering the local railway field by becoming stockholders in the Frankford & Sothwark Passenger Railway. James Sullivan became a vice-president of the Market Street National Bank in 1899 and its president in 1910. During the war he devoted much of his energy in developing the armor plate and projectile business of the Midvale Steel Company. For many years he had been a director of two of the companies included in the system of the Philadelphia Rapid Transit Company.

◆

R. J. Davidson

Robert J. Davidson, one of the founders of the American Brake Shoe & Foundry Company and of the Ramapo Iron Works, predecessor to the Ramapo Ajax Corporation, died at Daytona Beach, Fla., on April 3.

Mr. Davidson was born in the town of Blooming Grove, Orange County, N. Y., on June 18, 1850. Living near Craigville, he attended the public school of that place until about fourteen years of age, when he took the position of clerk in the village store. There he remained three years, and then went to Ramapo in the same line of business. In 1872 he accepted a position with the Ramapo Wheel & Foundry Company of Ramapo, N. Y., as shipping clerk. He held this position only a short time, when he was advanced to bookkeeper and later became correspondence clerk.



R. J. Davidson

In 1881 the Ramapo Iron Works Company elected him to the office of secretary. He, however, continued to fill his position with the Ramapo Wheel & Foundry Company until 1883, when he resigned that position and took an active part in the control and management of the Ramapo Iron Works, as secretary of the company.

He was instrumental with others in organizing the Ramapo Foundry Company, and when the latter was merged with the American Brake Shoe & Foundry Company he became a director, a member of the executive committee and chairman of the finance committee, which position he held until his death.

His main activities, however, were in connection with the Ramapo Iron Works, later the Ramapo Ajax Corporation. He was treasurer of this company at the time of his death and for 47 years he has been active in its management. He was equally interested in the village of Hillburn and was a leader in all church, school and community activities.

◆

J. B. Sheridan

John B. Sheridan, former director of the Missouri Committee on Public Utility Information, died at St. Louis, Mo., on March 15, following a nervous breakdown. Mr. Sheridan terminated his active connection with the committee in 1928, shortly after he attracted nationwide attention through testimony given before the Federal Trade Commission at Washington concerning the activities of his organization.

Prior to entering the public utility publicity field, Mr. Sheridan had worked on newspapers in St. Louis for 30 years. He was one of the first journalists to add life and color to the account of a baseball game. To his credit were many classic efforts in dramatic and musical criticism and in covering other assignments. He was the author of several books on sporting subjects. Mr. Sheridan was a native of Ireland.

◆

William A. Moberly, an employee for about thirty years of the Kansas City Public Service Company, Kansas City, Mo., died on March 13. Mr. Moberly entered the service of the railway in Kansas City in April, 1889, and was retired on a pension July, 1927, having been in the company's service continuously during that period. He started out as a cable splicer for the old Grand Avenue Cable Line. Thereafter he held various positions as driver, motorman, assistant superintendent and superintendent of various divisions of the company before entering the general office. He was in charge of the schedule department there, his office being a clearing house of railway information.

◆

John J. Borger, superintendent of electrical distribution for the Springfield Gas & Electric Company, Springfield, Mo., which controls the Springfield Traction Company, died on April 9. He was untiring in his devotion to the work assigned him, and did much work of an experimental nature outside the line of his regular duty. He was particularly active in his study of the problem of the effect of railway surges on radio reception.

◆

William F. Needles, former division superintendent of the Cincinnati Street Railway, Cincinnati, Ohio, is dead. He had retired from active service on account of illness. Mr. Needles began as a conductor in 1878, joined the Mount Lookout dummy line two years later and became an engineer on that crude old steam engine that towed two uncomfortable passenger cars, or at times freight cars, up what is now Delta Avenue. In 1898 he became a motorman on the East End line. From 1899 to 1903 he worked as carhouse foreman. On April 1, 1903, he returned to the transportation department as an inspector. On Oct. 1, 1905, he was promoted to the superintendency of the Avondale division, which position he held up to the time of his retirement.

◆

Fred M. Locke, inventor of the porcelain insulator and oven glass, is dead. He was 69 years old. Mr. Locke retired from business in 1904, devoting all his time to laboratory work and leaving the management of the Victor plant to a son, Fred J. Locke, who died on March 7.

◆

Charles William Woeber, of the Woeber Carriage Company, Denver, Col., died on March 16, aged 73. For a number of years the Woeber company manufactured and sold street railway cars all over the United States, but supplying principally companies in the West, particularly in Denver.

INDUSTRY MARKET AND TRADE NEWS

New Car Orders Show Encouraging Trend

Orders actually placed for city and interurban cars since the first of the year added to orders now pending total approximately 460 units, and substantiate early estimates to the effect that 1930 would see an encouraging revival in new purchases. Some fourteen properties have either placed orders or called for bids, in addition to which, two electrified steam railways have signed contracts for the construction of a total of 78 cars for extensions to their services. Thus in four months, in spite of a nation-wide business depression, the electric railways have indicated their intention of purchasing nearly one half as many cars as were ordered during the entire year of 1929.

Conspicuous among the orders of cars for city service is that of the United Railways & Electric Company, of Baltimore, for 150 units, the particulars of which are described elsewhere in this issue. Pending orders in large volume include that of the Detroit Department of Street Railways for 130 cars for city service. The North Shore Line is receiving 25 cars for high speed interurban service, while its companion line, the South Shore route, is soon to place orders for 20 additional units. The Youngstown Municipal Railway has received 13 cars of an advanced type for service on its city lines, and the Northern Indiana Railways, of South Bend, is having ten attractive interurban cars built.

◆

Cincinnati & Lake Erie Railroad Receives New Freight Cars

Fifteen double-end, all steel motor freight cars were recently delivered to the Cincinnati & Lake Erie Railroad, Dayton, Ohio, by the Cincinnati Car Corporation. The car bodies are 50 ft. long, 8 ft. 10 in. wide, and 13 ft. 3 in. from rail to top of trolley board. They have a capacity of 80,000 lb. of freight, and the weight, including equipment, is given at approximately the same figure.

While the bodies are new, the motors (of which there are four of the Westinghouse 303-A type), the control, and the MCB trucks with 37 in. wheels were taken from heavy interurban passenger cars which have been retired from service, soon to be replaced by lighter cars. Double-end Westinghouse H.L. control and Westinghouse Traction Brake Company's air brake equipment is provided.

The freight motors are designed to make schedule speeds up to 30 miles per hour, pulling trains of from five to fifteen box cars. They will operate over the system, which extends from Cincinnati to Toledo, and will also be available for interchange service.

◆

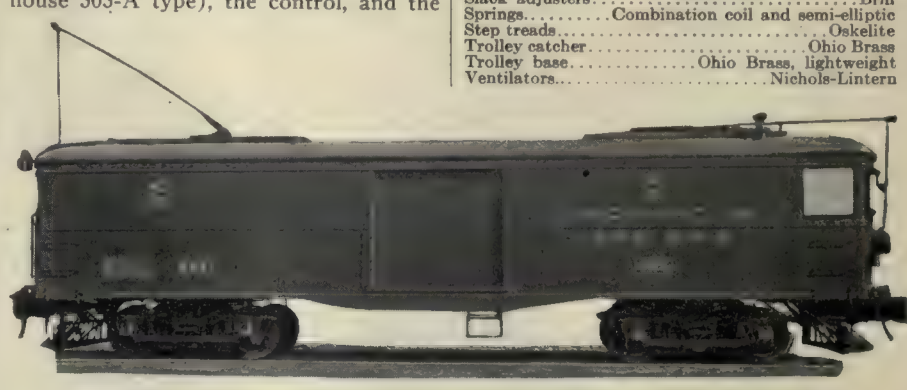
Ten New Cars for South Bend

Northern Indiana Railway, Inc., of South Bend, Ind., has placed an order with the Cincinnati Car Corporation for ten double-end, double-truck street cars for city service. Delivery is to be made about May 1.

The new cars, which are designed to seat 44 passengers, will have a length over the body posts of 41 ft. 6 in., and an over all width of 8 ft. 6 in. Bodies are to be of steel and wood, with walnut-interior finish. They will be provided with Westinghouse air brakes, Westinghouse K-75-E control, and with four 35 hp. Westinghouse motors, mounted on trucks supplied by the Cincinnati Car Corporation. Davis steel wheels, 26 in. in diameter, are supplied.

Other detailed specifications of the new cars are as follows:

Air brakes	Westinghouse
Axles	Cincinnati standard
Buffers	Corrugated face for use as anti climbers
Buzzer	Faraday high voltage
Car trimming	Bronze, light RR finish
Conduits	Duratube
Couplers	Standard
Destination signs (front and side)	Hunter
Door operating mechanism	National Pneumatic Company front door; treadle exit at rear
Fare boxes	Johnson
Fenders and wheel guard	Standard
Gears and pinions	Nuttall
Hand brakes	Drop type
Heaters	Consolidated, Thermostat control
Headlights	Ohio Brass WP—No. 29416
Journal boxes	Cincinnati standard
Lightning arresters	Westinghouse K-3
Lighting fixtures	Dayton
Paint	Outside, enamel, inside, varnish and stain
Sanders	Ohio Brass Co.
Sash and fixtures	Adams and Westlake
Seats	Hale & Kilburn—392
Seating material	Cleveland Tanning Company genuine leather
Slack adjusters	Brill
Springs	Combination coil and semi-elliptic
Step treads	Oskelite
Trolley catcher	Ohio Brass
Trolley base	Ohio Brass, lightweight
Ventilators	Nichols-Lintern



Fifteen freight motors of this type have been placed in service by the Cincinnati & Lake Erie Railroad

New Cars for Yakima Valley Company

A green color scheme contributes to the attractive appearance of new cars for a western property

Three double-end double-truck cars of the Master Unit type have been delivered to the Yakima Valley Transportation Company, Yakima, Wash., by the American Car Company division of the J. G. Brill Company.

Designed for one-man operation in city service, the cars have seats for 40 passengers and weigh, complete, 36,900 lb. Over-all length is 40 ft. 10 in., with a length over the body posts of 27 ft. 5 in. Over-all width is 8 ft. 5½ in., and height from rail to trolley base is 10 ft. 5 in. Bodies are of all steel construction, and the roof is of the arch type. Trucks are of the Brill No. 177-E-1-X type, with wheelbase of 5 ft. 4 in., and are provided with cast iron wheels, 26 in. in diameter, supplied by the American Car & Foundry Company.

Other features of the new cars are as follows:

Air brakes	Westinghouse Traction Brake Company
Armature bearings	Ball type
Axles	Hammered steel
Car signal system	Consolidated Car Heating Company
Compressors	General Electric Company's C.P.-28
Conduit	Flexible
Control	Westinghouse K-75
Curtain fixtures	Rex, all-metal
Curtain material	Pantasote No. 84/84
Destination signs	Hunter
Door Mechanism	National Pneumatic Company
Doors	Folding
Finish	"Old Dutch" enamel
Floor covering	Flexolith
Gears and pinions	Helical
Glass	Libby-Owens plate
Hand brakes	Brill Vertical
Heaters	Consolidated Car Heating Company
Headlights	Crouse-Hinds
Headlining	¼ in. Agasote
Interior trim	Mahogany
Journal bearings	Plain
Journal boxes	Brill
Lamp fixtures	Electric Service Supply Company No. 27901
Motors	Westinghouse No. 510-E, inside hung
Roof material	Wood, canvas covered
Safety car devices	Westinghouse Air Brake Company
Sash fixtures	Dayton
Seats	Brill No. 201-D
Seat spacing	3 ft. 5 in.
Seating material	Leather
Slack adjusters	Brill "Mechanical"
Steps	Stationary
Step treads	Kass
Trolley retrievers	Ohio Brass Company No. 13120
Trolley base	U.S. No. 13
Trolley wheels	U.S.
Ventilators	Brill "Exhaust"
Wheelguards	Hudson Bowring trays

Wide aisles, spacious plate glass windows, comfortable seats and well-diffused lighting are features of new cars for the Yakima Valley Transportation Company

◆

C. H. Jensen has joined the engineering staff of the Copperweld Steel Company, Glassport, Pa. He was formerly with the Pittsburgh branch of the Byllesby Engineering & Management Corporation. Mr. Jensen was graduated from Washington State College in 1917. After leaving college, he was employed by the Westinghouse company as a graduate student, later entering the supply engineering and transformer engineering departments. In 1924, he entered the distribution engineering department of the West Penn Power Company in Pittsburgh, and in 1926 transferred to the Duquesne Light Company. When the Pittsburgh branch of the Byllesby Engineering & Management Corporation was formed in 1927, Mr. Jensen was transferred to that organization, and has since been associated with it.

◆

Speer Carbon Company Enters Railway Field

The Speer Carbon Company of St. Marys, Pa., has recently announced a new and complete line of railway brushes. This company is one of the oldest carbon manufacturers in the United States, having been organized in 1899. The new Speer line of brushes includes grades suitable for all types of railway motors, whether of the ventilated or enclosed types, and for operation on all voltages of alternating or direct current.

◆

South Shore Line to Have New Shop

The Chicago South Shore & South Bend Railroad has started work on a new shop building to be erected at a total cost of $235,000 at Michigan City, Ind. Grading operations are now well under way and are expected to be finished in a month. Actual construction will be started in May, and the building is expected to be completed by August 1. It will be constructed of steel, concrete, brick and glass and will be fireproof throughout. The walls will be largely of glass and the roof will be saw-toothed with windows facing north to provide daylight inside. The new shop will have two traveling cranes, of 5- and 10-ton capacity. Cars will be taken in and out of the shop over a transfer table.

The contract for the construction of the building has been let to P. H. Lorenz. Arthur U. Gerber, of Chicago, is the architect.

◆

Bus Deliveries Continue at Steady Rate

Greater stability in the use of buses as a means of transportation in local districts and for intercity service is indicated by the absence of new names among recent purchasers listed below. Deliveries reported during March and April, both for replacements and for extensions of present services, appear to be confined almost entirely to operations established several years.

Twin Coach deliveries include ten units of the urban type, including one gas-electric, to the Youngstown Municipal Railway, which already had ten buses of this general type in service. The Boston Elevated Railway and the Portland Electric Power Company, of Portland, Ore., each added one urban type Twin Coach to its present bus fleet, while the Milwaukee Electric Railway & Light Company added three Twin Coaches of the parlor car type, equipped with reclining chairs. The San Diego Electric Railway has placed orders for three 40-passenger buses to supplement its present fleet and take care of increasing travel on its established routes. Two of the buses will be supplied by the Twin Coach Corporation, and one by the American Car & Foundry Motors Company.

Tri-City Railway, of Davenport, Iowa, has received one Mack Model AB 29-passenger city type bus, and the Iowa Southern Utilities, of Centerville, has accepted delivery of seven Model AB 25-passenger city type buses from the same manufacturer. The Connecticut Company and the Denver Tramway Corporation have also increased their equipment by the addition of five and two Mack Model BC 29-passenger buses respectively.

General Motors Truck Company reports deliveries to electric railway properties of its Type U city service units as follows: Five to the Ft. Madison Street Railway; two to Oklahoma Railway; five to Pittsburgh Motor Coach Company; and one to the Beaver Valley Motor Coach Company, of New Brighton, Pa. Six Type Y coaches for intercity service were delivered to the Dayton & Columbus Transportation Company, of Springfield, Ohio, and the Potomac Edison Company, of Cumberland, Md., accepted three additional Type W buses for city service. Canadian deliveries include twelve Type W city service coaches to the London Street Railway Company, and a Type Z coach to the Toronto Transportation Commission.

A.C.F. deliveries during the month include ten 40-passenger coaches of the metropolitan type to the Boston Elevated Railway, and eleven chassis to the North Coast Transportation Company, of Everett, Wash. Of this last order three have a 264-in. wheelbase and eight a 240-in. wheelbase. The chassis will be mounted with bodies of the Newell type and will be used in intercity service.

Conspicuous among recent White deliveries are to be noted four Model 53 buses to the Cia. Force Nordeste de Brazil, and nine buses of similar model to the Pernambuco Tramways & Power Company. White has also recently delivered four Model 65A buses to Montreal Tramways, three Model 54 buses to Los Angeles Railway, three Model 50B buses to the Middlesex & Boston Street Railway, and one Model 54 bus to the Lewistown Transportation Company of Lewistown, Pa. Fourteen White buses ordered early in the year have been delivered to Public Service Co-ordinated Transport, of Newark, N. J.

◆

General Motors and Leyland Buses for Toronto

Engines of 150 hp. are to be installed in ten of the twenty new buses which are now being built for the Toronto Transportation Commission, Toronto, Ont. The highest horsepower hitherto in use in the city fleet has been 110. The engines are part of the new chassis being secured from General Motors. The other ten chassis, imported from the Leyland works in England, will have 100-hp. engines.

The bodies for the new buses are being built at the Hillcrest shops as a measure of unemployment relief. The new vehicles will be used on existing city routes.

The bodies for the General Motors chassis will seat 29 passengers, but will have no treadle door. Those for the Leyland chassis will seat 27 and will be equipped with the treadle.

◆

Okonite Company; Okonite, Callender Cable Company, Inc., and the **Hazard Insulated Wire Works Division of the Okonite Company,** announce that they will presently move their Chicago offices to suite 2828 of the 20 North Wacker Drive Building in that city.

Price of Copper Reduced to 14 Cents Per Pound

Just a year to a day after the price was pegged at 18 cents, Connecticut delivery, the price of copper was cut to 14 cents a pound, this constituting one of the most abrupt declines in commodity prices that has been recorded in recent years. In well-informed quarters the reduction was not unexpected, as it had been known for some weeks that small producers had been shading the price to certain customers.

The quotation of 18 cents a pound, established on April 15, 1929, followed a swift advance that had carried the price of the red metal to a maximum of 24 cents, which was attained during March of last year. This peak followed a heavy wave of buying, but it is believed that comparatively little copper changed hands at the high levels. Cautious buying, following the reduction to 18 cents, continued until it assumed the proportions of a buyers strike. This, however, was of short duration, and gave way to well-sustained purchases that continued until the collapse of the stock market and the resultant slump in business.

◆

General Cable Reorganizes District Sales Offices

A new field sales policy has been made effective by General Cable Corporation, by the establishment of eighteen district and territorial sales offices, and the assignment of the entire district sales personnel of Dudlo, Rome, Safety and Standard Underground Divisions to these new territories.

Until this change, the sales organizations of the four Divisions had functioned in parallel, maintaining the industry contacts which each had established over many years of service. This reorganization of sales forces further consolidates these facilities and makes them more readily available.

The identities of the thirteen companies comprising the four operating divisions will be continued as manufacturing and shipping units, and all present trademarks will be continued. Resident engineers will be located in the district and territorial sales offices, where they will represent locally the headquarters consulting engineering staff.

◆

TRADE NOTES

Edwin N. Hazlett has recently joined the sales engineering department of the Copperweld Steel Company, Glassport, Pa. Mr. Hazlett was graduated from the University of Pittsburgh in 1928, and then completed the apprentice engineering course with the Duquesne Light Company. He has been connected with the distribution department of the Duquesne Light Company at McKeesPort, Pa., on transmission work.

◆

DeVilbiss Company, Toledo, Ohio, announces that the expansion of its overseas business has called president Allen Gutchess and Export Manager Rex Wells to Europe, where they will be engaged for several weeks working with the executives in charge of the London and Paris factories and sales offices of the company. Increasing industrial activity in Europe is reflected in greater demands upon the DeVilbiss organization serving overseas markets.

◆

Consolidated Car-Heating Company, Inc., Albany, N. Y., announces its new Chicago address as the Buckingham Building, 59 East Van Buren Street.

◆

American Steel Foundries announces appointment of F. A. Lorenz, Jr., as general manager of the Indiana Harbor and Pittsburgh works, in charge of sales and production. Mr. Lorenz has held the position of manager of sales for Davis Wheels; assistant to the fourth vice-president; works manager at Indiana Harbor, and now leaves the position of assistant vice-president in charge of operations.

◆

Roller-Smith Company, 233 Broadway, New York, announces the appointment of Henry N. Muller Company, First National Bank Building, Pittsburgh, Pa., as its district sales agent in western Pennsylvania, eastern Ohio and West Virginia.

◆

Continental Brake Shoe & Equipment Company, New York, has opened a Cleveland office in the Terminal Tower, in charge of Paul Zens, who has been elected a director and vice-president of the company.

◆

George H. Palm, for the past six years engineer with the new development division of the Yellow Coach & Manufacturing Company, Pontiac, Mich., a division of General Motors, has become connected, as engineer in charge of radiator construction and equipment, with the Young Radiator Company, manufacturers of truck, bus, power unit and engine cooling radiators, as well as heating units, located at Racine, Wis.

◆

Twin Coach Corporation announces the removal of its New York offices to the new Chrysler Building, 405 Lexington Avenue, corner 42nd Street.

Electric Railway Material Prices—May 1, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	14.00
Lead, cents per lb.	5.50
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.15
Tin, Straits, cents per lb.	36.75
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	41.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.35
Somerset mine run, f.o.b. mines, net ton	2.00
Pittsburgh mine run, Pittsburgh, net ton	1.40
Franklin, Ill., screenings, f.o.b. mines	1.70
Central, Ill., screenings, f.o.b. mines	1.45
Kansas screenings, Kansas City	1.85

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive $\frac{9}{16}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.08
Angles bars, cents per lb	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.85
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.30
Sheet iron (24 gage), cents per lb.	2.60
Sheet iron, galvanized (24 gage), cents per lb.	3.30
Galvanized barbed wire, cents per lb.	2.95
Galvanized wire, ordinary, cents per lb.	2.90

Waste—New York

Waste, wool, cents per lb.	10.00 to 15.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	9.00 to 12.00
Colored	6.00 to 10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.6
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	0.59
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	15.50
Rubber-covered wire, No. 14, per 1,000 ft.	$5.30
Weatherproof wire base, cents per lb.	15.25

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.75
Light copper, cents per lb.	10.00
Heavy yellow brass, cents per lb.	6.50
Zinc, old scrap, cents per lb.	2.00
Lead, cents per lb. (heavy)	4.00
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	16.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

You have money invested with your motormen:

PROTECT IT

with

"PEACOCK"

Staffless Brakes

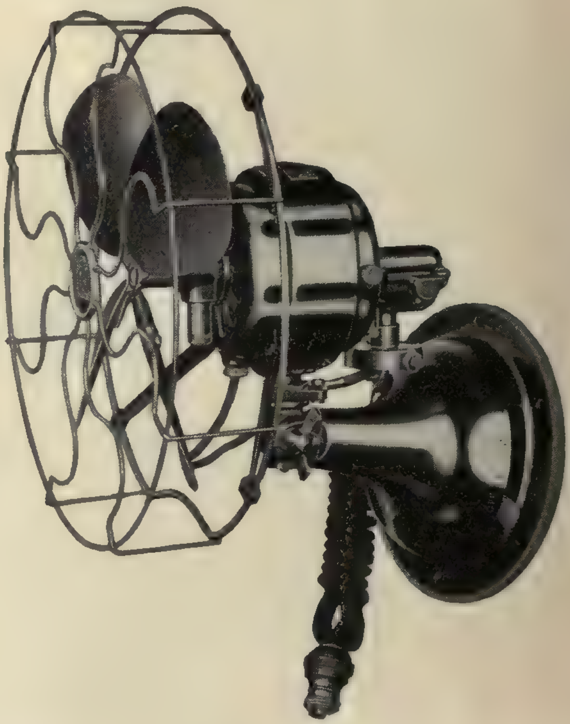
It has cost you money in schooling and training the men who are operating your cars. Isn't it fair to your pocketbook to give these men the best safety devices?

Nothing is more important than brakes that will be positive—sure—at all times. With "Peacock" Staffless Brakes your equipment, passengers and crew are safe in any emergency.

National Brake Company, Inc.
890 Ellicott Square Buffalo, N. Y.

Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.
The Ellcon Company—General Sales Representatives
50 Church St., New York

breeze-making .. then and now



ELECTRIC FANS have changed since the day when Mark Twain made his famous remark: "I have always had an ambition to throw an egg into an electric fan." The old-timers were rather crude affairs when compared with the efficient little breeze-makers of today.

When the 110-volt D. C. motor shown above was still in use, nearly all electrical power distribution in cities was direct current, making the use of copper-leaf brushes feasible. Little attention was paid to noticeable sparking and commutator wear. Then distribution conditions changed. Fan motors were required to operate on alternating as well as direct current.

Brushes were required to give several hundred hours of life without commutator wear. Practically sparkless commutation was demanded. Copper brushes were out of the question—only carbon brushes could meet these conditions. Special National Pyramid Brushes were developed to supply the need.

This is just one of thousands of instances where National Carbon Company, Inc., played an important part in promoting the progress of electrical industry. The unlimited facilities offered by National Carbon Research Laboratories enable our engineers to keep abreast of current progress.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division: SILVER STRAND CABLE TRADE MARK REGISTERED Cleveland, Ohio

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Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

As a service of information, advertising works toward a constant improvement in the standard of living.

As a stimulus to competition it has improved the character and standards of American business.

As a builder of national distribution and large scale operation, it has made possible improved quality at a reduction in cost.

These are some of the benefits that advertising confers without cost on the consuming public—and some of the reasons why Collier Service Car Cards are a real adjunct to your service.

BARRON G. COLLIER
INCORPORATED
NEW YORK

CAR CARD ADVERTISING ALMOST EVERYWHERE

4,000,000 Miles of In

CITIES SERVICE OILS
ONCE - ALWAYS

Buses of the Great Lakes Stages travel nearly 4,000,000 miles a year, part of it at high speed in the open country, part of it in the congested streets of great cities such as New York, Chicago, Cleveland, Boston and Detroit. Schedules must be maintained, breakdowns avoided, maintenance costs kept low—so Great Lakes Stages use Cities Service Gasolene and Koolmotor Oil and Grease.

They aren't guessing at Cities Service quality; they know that Cities Service products have been subjected to more gruelling tests in Cities Service's own fleet of more than 4000 motor vehicles, than any single bus line could give. Throughout the country bus owners are realizing that they could have no better guarantee of service than the performance of Cities Service products in Cities Service vehicles and in the buses of other operators.

A Cities Service engineer, on request, will gladly study your power and lubrication problems and recommend the correct gasolene, oil and grease.

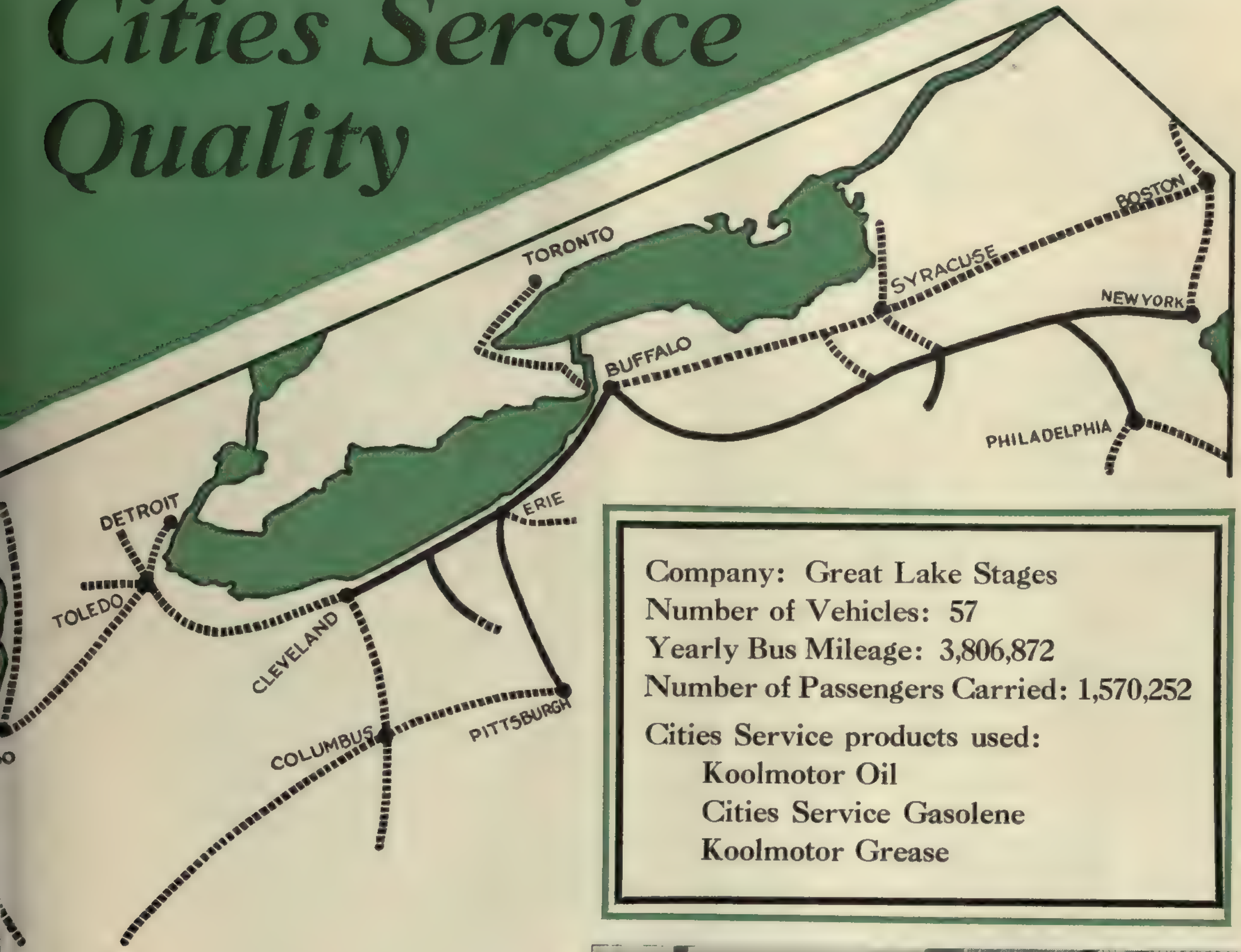
CITIES SERVICE COMPANY

60 Wall Street New York City

CITIES SERVICE OILS
ONCE - ALWAYS

KOOLMOTOR PRODUCTS

ter-City Travel Prove
Cities Service
Quality



Company: Great Lake Stages
Number of Vehicles: 57
Yearly Bus Mileage: 3,806,872
Number of Passengers Carried: 1,570,252
Cities Service products used:
Koolmotor Oil
Cities Service Gasolene
Koolmotor Grease

ANACONDA
from mine to consumer
REG. U.S. PAT. OFF.

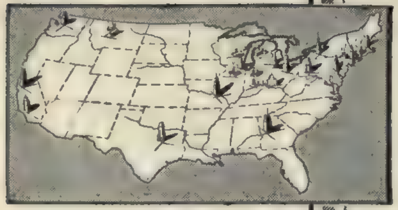
TROLLEY WIRES . .

that *always* stand the "wrap" test

BEFORE buying trolley wire, subject it to the "wrap" test . . . Know that it will wrap on itself without giving evidence of failure.

Anaconda Trolley Wires stand tests of this kind because they are drawn from pure copper and homogeneous alloys of remarkable ductility. Unified control by a single organization *from mine to consumer* safeguards their uniformity.

High in conductance, strong and tough, Anaconda Trolley Wires meet the most exacting specifications for hard-drawn copper and bronze wires. Engineering data and complete information furnished on request.



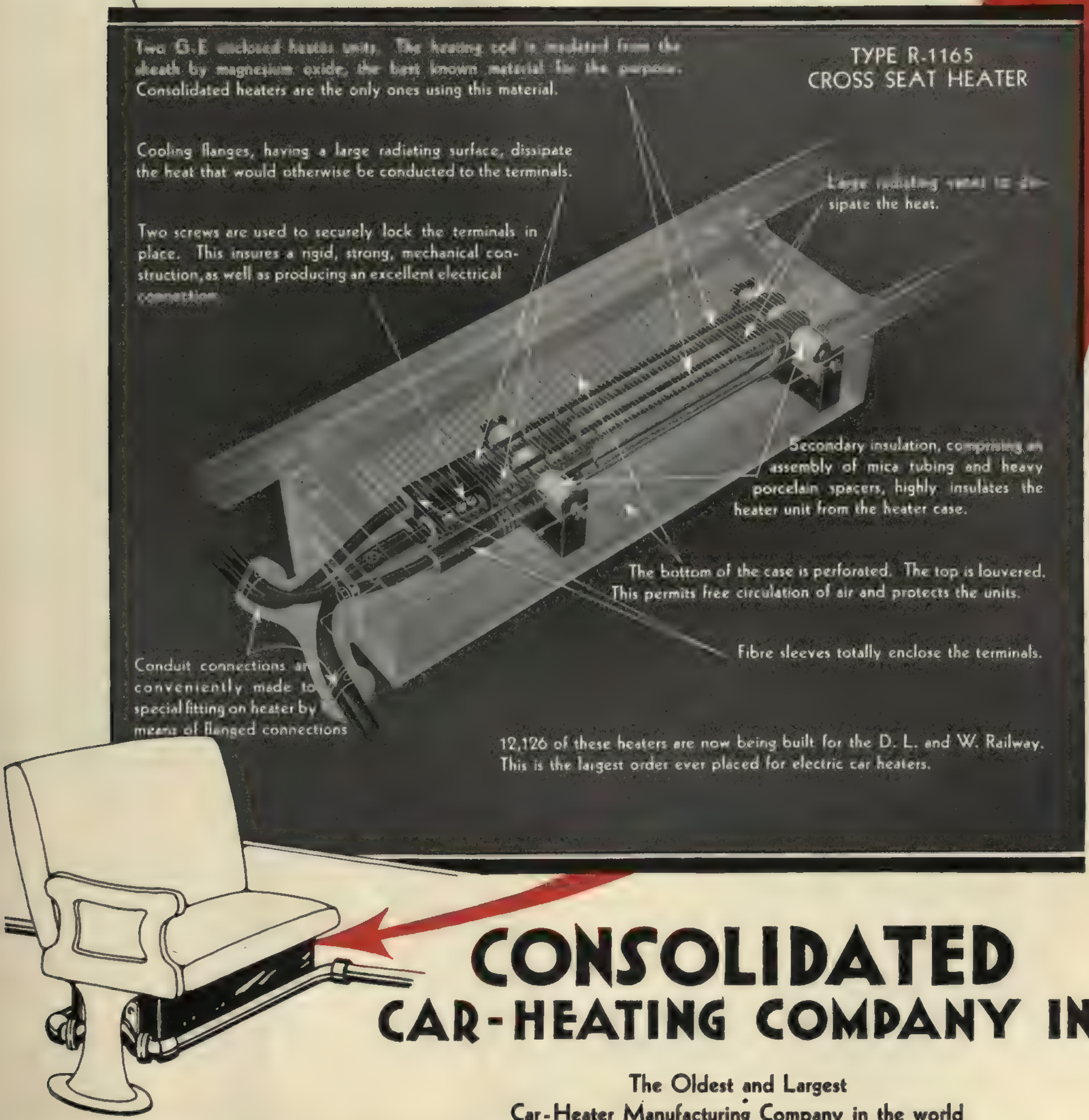
Anaconda safeguards quality from mine to consumer—provides a nationwide service, prompt, dependable, complete.

ANACONDA WIRE & CABLE COMPANY

General Offices: 25 Broadway, New York City
Chicago Office: 111 West Washington Street
Sales Offices in Principal Cities

What's Inside?

A 3,000 VOLT HEATER



TYPE R-1165
CROSS SEAT HEATER

Two G.E. enclosed heater units. The heating coil is insulated from the sheath by magnesium oxide, the best known material for the purpose. Consolidated heaters are the only ones using this material.

Cooling flanges, having a large radiating surface, dissipate the heat that would otherwise be conducted to the terminals.

Two screws are used to securely lock the terminals in place. This insures a rigid, strong, mechanical construction, as well as producing an excellent electrical connection.

Large radiating vanes to dissipate the heat.

Secondary insulation, comprising an assembly of mica tubing and heavy porcelain spacers, highly insulates the heater unit from the heater case.

The bottom of the case is perforated. The top is louvered. This permits free circulation of air and protects the units.

Fibre sleeves totally enclose the terminals.

Conduit connections are conveniently made to special fitting on heater by means of flanged connections

12,126 of these heaters are now being built for the D. L. and W. Railway. This is the largest order ever placed for electric car heaters.

CONSOLIDATED
CAR-HEATING COMPANY INC.

The Oldest and Largest
Car-Heater Manufacturing Company in the world

NEW YORK **ALBANY** **CHICAGO**

The Combined Experience of Many Industries

DeVilbiss Spray Painting Equipment is so outstandingly successful in transportation industries because DeVilbiss specialized installations are designed in the light of a vast and comprehensive experience in all industries.

DeVilbiss Spray Finishing Equipment is constantly used in an almost infinite number of industries. Numerous widely varied operating conditions, production methods and finishing materials must be served.

DeVilbiss engineers are thus enabled to bring to the specific task a measureless wealth of proved knowledge and to apply to each individual case the composite experience of many.

Every day, almost, new knowledge becomes applicable to spray finishing operations in industry. It will pay you to learn what study and use have recently revealed to help you to put a bigger measure of economy and speed into your own finishing operation. It costs you nothing to talk to us about it.

Look to DeVilbiss For

Spray guns of various types and sizes

Pressure feed paint tanks and containers

Spray booths, exhaust fans, and approved lighting fixtures

Air compressing equipment

Air transformers and accessories

Air and fluid hose and connections

Complete outfits from the smallest hand-operated units to the largest industrial installations

DeVilbiss
Spray- PAINTING FINISHING **System**

THE DEVILBISS COMPANY , 272 PHILLIPS AVENUE , TOLEDO, OHIO

Sales and Service Branches

NEW YORK PHILADELPHIA CLEVELAND DETROIT INDIANAPOLIS CHICAGO
ST. LOUIS SAN FRANCISCO LOS ANGELES WINDSOR, ONT.

Direct factory representatives in all other territories

Heavily loaded Union Metal Poles serve Wheeling, W. Va.

For Heavy Duty Work on City Streets

UNION METAL POLES have become widely known as the finest equipment for combination street lighting and distribution line systems. Such installations are usually ornamental and carry only a light load.

For extremely heavy loading, Union Metal Poles are just as practical and economical. While doing the job of the ordinary pole, they also improve the street appearance and build good-will for themselves.

In Wheeling, W. Va., one set of Union Metal Poles carries light and power circuits, railway feeders, fire-alarm circuits, trolley span wires, street lighting fixtures, traffic signals and street signs. This installation decreased the number of poles along the curb and substituted a straight, attractive fluted pole for the unsightly equipment of the ordinary type.

No matter what your strength requirements, Union Metal can supply poles to fill the need.

THE UNION METAL MANUFACTURING COMPANY
GENERAL OFFICES AND FACTORY ◆ CANTON, OHIO
SALES OFFICES: New York, Chicago, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
Graybar Electric Company, Inc. General Electric Supply Corp.
Offices in all principal cities

UNION METAL DISTRIBUTION POLES

"STANDARD" STEEL PARTS

There Must Be Quality In Vital Hidden Parts

The modern car must not only be of economical size and attractive in appearance, but also have vital, hidden parts of a quality that will contribute to safety and dependability in operation. The specification of Standard Steel Wheels, Axles, Armature Shafts and Springs will help you obtain a car which is modern all the way through.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, Pa. WORKS: BURNHAM, Pa.

Products

Steel Axles Steel Springs Armature Shafts Rolled Steel Wheels

SALES OFFICES:

New York Chicago St. Louis Richmond Portland San Francisco

50%
INCREASE

In Mack bus sales over first quarter of 1929 —Because Mack four and six cylinder buses meet every need of the industry.

Mack-built City or Interstate Bodies —25 to 41 passengers.

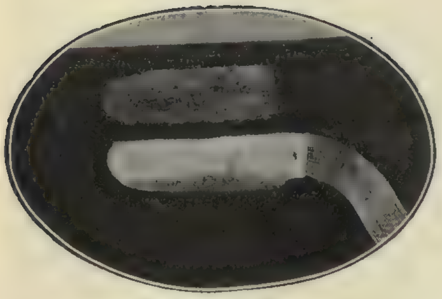
MACK TRUCKS INC.
25 Broadway New York, N. Y.

Mack

IT TAKES FROM 10 TO 15 TONS TO REMOVE THIS BOND

Though easily and quickly brazed to the rail, an Erico Brazed Bond is there to stay.

It becomes an integral part of the rail—making and keeping, under all conditions, the perfect contact that maintains voltages and reduces power costs.



As evidence of Erico bond and bonding efficiency, over 30,000 lbs. were required to shear this brazed bond terminal from the rail. Permanency is guaranteed. The area of copper left on the rail was just 8 times the cross-sectional area of the bond conductor. This ratio of copper to steel assures maximum bond conductivity.

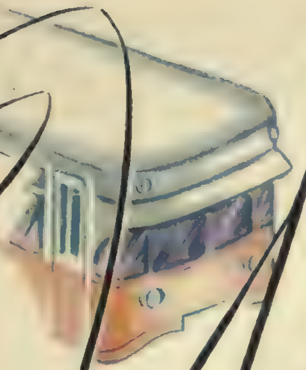
No amount of service—heavy pounding traffic or accelerated speed—will loosen it. In fact it takes from 10 to 15 tons' shear pressure to remove it from the rail.

Whether you choose steel arc weld or copper arc weld, Erico bonds provide a sure track return with the simplest method of application. They mean permanent installation at low cost, help you get the most from your bonding dollar.

Let us send you samples
for inspection and test.

The Electric Railway Improvement Co.
2070 East 61st Place Cleveland, Ohio

ERICO
RAIL BONDS AND BONDING OUTFITS



What's wrong with urban transportation?

CAN WE PICK THE FARES OFF THE CURB

Urban transportation

The walk-up-one-flight-and-save-ten customer you are sure to get—the necessity rider.

But the well-dressed men and women of a push-button age who like tone, character and dignity just aren't dodging autos any longer to get to your place of business in the center of the street.

Progressive business houses always move-up-town. Why don't you move up-to-the-curb.

Curb loading with rail-less units, either bus or trolley bus, is here to stay along with radios, electric ice boxes, oil-burners.

MUST MOVE

therefor

Investigate the three-year proven and tested Twin Coach capacity body design for bus or trolley bus—with standardized inter-changeable parts for each.

Guaranteed against OBSOLESCENCE!

There has always been an unknown quantity — in every transportation tangle — sort of an algebraic "X".

The "X" for most managements has been how to reduce the electric transportation investment — to clear the way for rail-less equipment.

Most managers would long ago have moved up-to-the-curb if they could have found the way.

Gentlemen, it is time to sit up and take notice — the trolley bus bids fair to be that "X" — the missing quantity in the tangle.

Segregate your modern rail car equipment on your route trackage, which is still in good shape — replace the expensive obsolete equipment with trolley buses, which can be advantageously bought on a car trust plan.

Under this plan you lay down a definite programme for getting moved over to the curb where the most business exists; you get rid of those money-eating, customer repelling old cars and save the investment in over-head and power facilities.

You slash the track maintenance expense; you relieve yourself of many taxes; you add equipment which operates for considerably less than the trolley car it replaced, and at a fare which permits a profitable inter-change of transfers, with the remainder of your system. You increase your system speed.

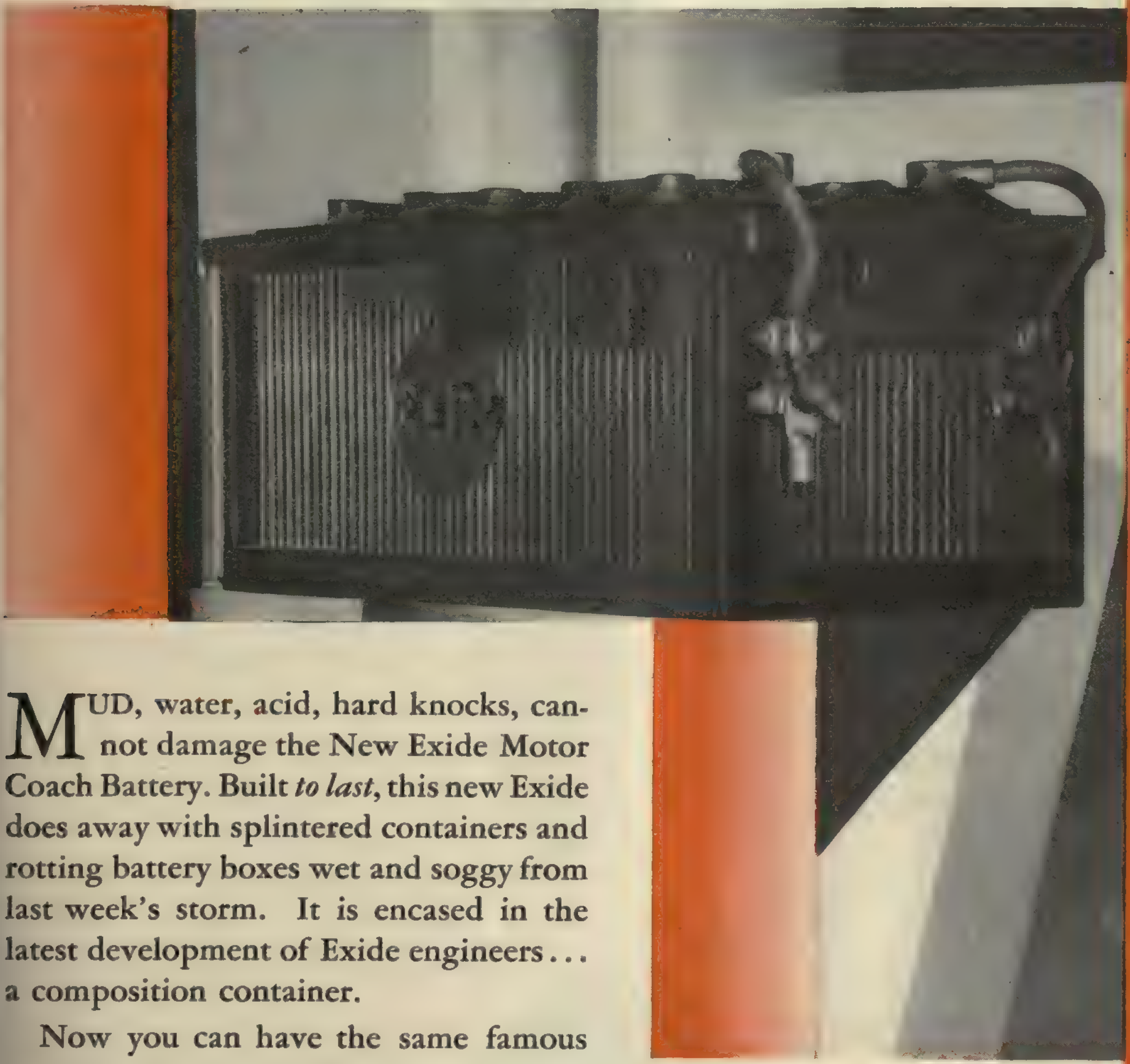
Set your auditor to work on a tentative programme of this kind, based on your own situation; send your equipment Superintendent to Chicago to see their great new trolley bus programme in actual operation — and if you feel a re-occurrence of your old time pep, take the train yourself. If New Orleans or Salt Lake City is handier — visit one of their trolley bus operations.

Gentlemen, something is happening!

Write Ross Schram at Kent, Ohio, for news of the latest developments.

HERE'S LOTS OF BUSINESS AT THE CUR

The Toughest Bus Service WON'T BOTHER *this* NEW EXIDE BATTERY



Latest development of Exide engineers for improved bus battery service

MUD, water, acid, hard knocks, cannot damage the New Exide Motor Coach Battery. Built *to last*, this new Exide does away with splintered containers and rotting battery boxes wet and soggy from last week's storm. It is encased in the latest development of Exide engineers . . . a composition container.

Now you can have the same famous qualities that have led fleet owners everywhere to standardize on Exides, *plus* increased economy and dependability.

Write for information on the New Exide Motor Coach Battery. Let us show you how it can save you money . . . cut your maintenance costs.

Exide
MOTOR COACH
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE
Exide Batteries of Canada, Limited, Toronto

Carnegie Wrought Steel Wheels fulfill every requirement of the perfect wheel for electric railway service. They are safe—as only *rolled* steel wheels can be. 10,000 ton hydraulic presses impart to the steel a tough, dense structure, free from irregularities that might cause failure. They are durable—rendering long and continuous service. In addition to forging, they are thoroughly rolled, further refining the wearing surface. Mileage is forged in and rolled in—extra mileage that makes Carnegie Wheels the outstanding value in the wheel market today.

In city service these wheels have an added advantage in that cars may be speeded up with safety over special track work at crossings—an important factor in rush hours.

Carnegie Wrought Steel Wheels have satisfactorily answered the wheel questions of many prominent electric railways. Let them answer yours. Your inquiry will receive prompt attention.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

70

CAROLINA COACH COMPANY, 510 EAST DAVIE STREET, RALEIGH, N. C., USES GOODYEAR TIRES EXCLUSIVELY ON ITS COACH FLEET

A Goodyear Tire Advertisement

written entirely by

CAROLINA COACH COMPANY

"GOODYEAR Tire & Rubber Company, Akron, Ohio, Gentlemen: When we renewed our contract with you, the drivers of our 51 buses expressed unanimous approval of our selection for another year. This fact is significant of the service received from Goodyear Tires.

"Last year our buses operated a total of 2,687,698 miles, and on a fast schedule, an average of more than 7300 miles every day, including Sundays. In a service such as ours we need maximum traction, and a minimum of tire trouble. To anyone needing this combination, we heartily endorse Goodyear All-Weather Tread Tires." Carolina Coach Company, Raleigh, N. C., H. H. Hearn, General Manager.

More People Ride on Goodyear Tires Than on Any Other Kind

THE GREATEST NAME IN RUBBER

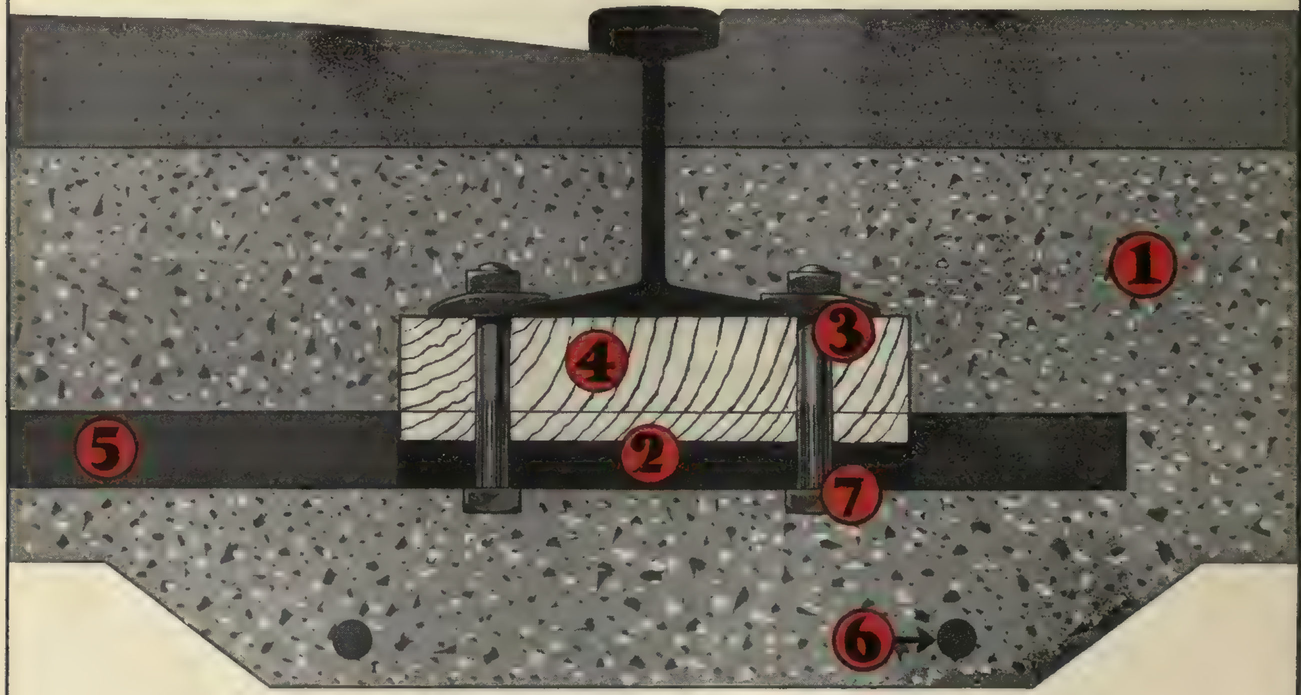
GOODYEAR

ON YOUR NEW COACHES SPECIFY GOODYEARS

. . . THE TRACK

must be more than

Dayton Ties are the only ties that achieve for concrete in track foundations the permanence it was meant to give, for Dayton Ties are the only ties that absolutely dissipate rail vibration and prevent "VIBROLITION."



Dayton Ties require no major maintenance at all. Their condition, after 15 years of service under every conceivable burden of traffic, points conclusively to real and genuine permanency.

"The Better Tie Without An Alibi"

THE DAYTON INTEGRAL SYSTEM O

STRUCTURE *of* TODAY
THEORETICALLY CORRECT

THE achievement of long life for track structures in paved streets is the goal of many . . . but the realization of few. Theories have been advanced in many different forms intended to provide a structure of satisfactory life and low maintenance—but few have stood the acid test of actual practice. ¶ When concrete with its seemingly immeasurable strength, tested and proved in most every conceivable form of structure was put forth, it was thought and reasonably so, that the ideal foundation for track had at last been found. Theoretically, concrete is the one permanent foundation for track and paving structure. But to achieve the permanence that concrete was meant to give, fact, not theory, must govern in actual practice and the one fact that upsets the entire apple-cart of theory is that steel rails vibrate and they transmit vibration, the *one element* that concrete of itself is unable to resist unless properly insulated. To permit theories, no matter how plausible, to fly in the face of this fact has proved disastrous in too many cases to elaborate. ¶ The Dayton Integral System of Track Structure does achieve the permanence that concrete was meant to give because in this form of structure—a tie is provided that sets up an impenetrable barrier to vibration. And for this reason Dayton Ties can be installed not only with a more economical first cost—but with a permanence that means the virtual cancellation of maintenance expense. ¶ Car properties cannot always fly in the face of fact. Better, far better, to weigh the evidence now. Begin now to disregard the detours of theory and take the straight road to facts and permanency by specifying Dayton Ties.

1. Concrete...everlasting because *protected* from destroying vibration. 2. The Dayton "shock absorbing" element that dissipates vibration and insures the permanency of the concrete structure. 3. ¾" Bolts and clips—stay put permanently. 4. White Oak Wood Blocks—asphalt seal coated against moisture. 5. Steel angles reinforce concrete but do not bisect it. 6. Steel rods (one under each rail) provide reinforcement at point of greatest tensile strain. 7. Bolt heads pull directly against steel angle—assuring permanent tightness.

The Dayton Mechanical Tie Company
Dayton, Ohio

TRACK AND PAVING STRUCTURE

Bethlehem Silico-Manganese Weldable Crossing and turnout at 10th and Arch Sts., Philadelphia, Pa.

For heavy-traffic locations use *silico-manganese* trackwork

THE new Bethlehem Silico-Manganese Weldable Trackwork has high resistance to impact and abrasive wear. The extremely fine-grain and dense structure of silico-manganese steel becomes more firmly set under constant impact. These qualities combined with weldability make Bethlehem Silico-Manganese the logical trackwork to install at all heavy-traffic locations.

Bethlehem Silico-Manganese Trackwork is readily weldable by any of the standard methods, such as electric-arc, oxy-acetylene or Thermit welding.

The wear-resisting properties of Silico-Manganese steel are well established. For years it has been the standard for high-grade tools such as punches, chisels, shear blades, as well as for finest quality automobile springs, and for parts subject to shock and extremely hard grinding wear with little or no lubrication.

Bethlehem Silico-Manganese Weldable Trackwork can be installed at all heavy-duty locations with confidence that it will stand up under the most severe conditions of service.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.
District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.
Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.
Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

BETHLEHEM
Silico-Manganese
Trackwork—Design 999

No. 8M5 Special

No. 327-M Special

No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

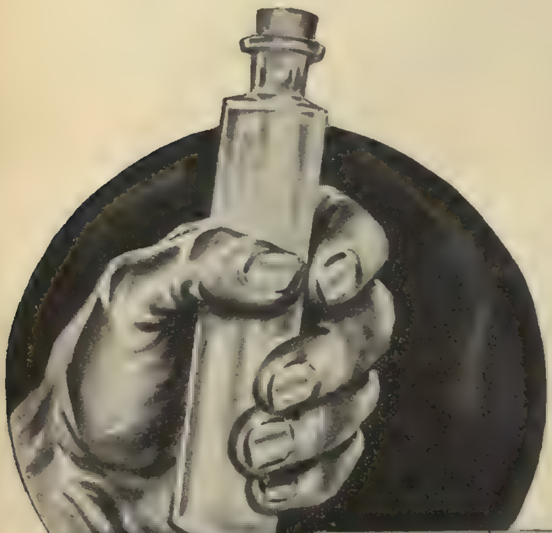
The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

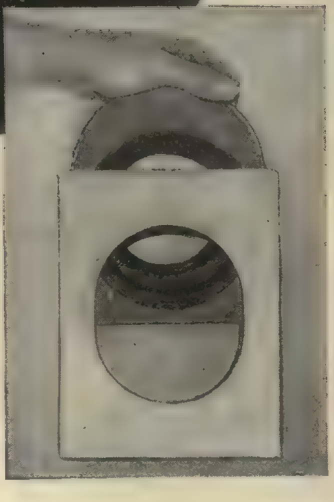
Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

HEYWOOD-WAKEFIELD COMPANY
Boston, Massachusetts

516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

A NEW TREND in railway lubrication





Texaco Lovis Oil is made in two grades 38 and 70 sec. Saybolt viscosity. The new Texaco Oil Seals are easily inserted in the dust guard slot back of the journal box and form a perfect seal that will give years of service, preventing both oil leakage and the entrance of abrasive dust and dirt.

The electric railway industry is spending *more* for lubricants. It is spending *less* for lubrication. Texaco Lovis Oil and the new Texaco System of Lubrication have effected surprising economies. Electric railway lubrication is on an entirely new basis.

The Texaco System, of which a specially designed Texaco Oil Seal is a vital element, has for the first time in the history of rail transportation made it possible to use a really efficient car journal lubricant.

Operating results with Texaco Lovis Oil show a marked reduction in bearing troubles, substantial power savings and incidental economies in waste consumption, time and labor that are remarkable. The cost for lubrication is actually less.

Engineers of The Texas Company will gladly present the facts to any railway official. Tests are being made on many of the country's leading roads and much valuable data on the new Texaco System is becoming available. Write The Texas Company direct.

TEXACO LUBRICANTS

THE TEXAS COMPANY
135 East 42nd Street, New York City

Greyhound

America's largest and most experienced Transcontinental Bus Operator

selects

after millions of miles of operating experience with all types of equipment

Yellow

the new 33 passenger Parlor Coach, with the 150 h.p. Yellow "616" Engine

Type 250

YELLOW COACH

GREYHOUND LINES

Equipped with comfortable, widely spaced double de luxe reclining chairs with individual backs and head rests. The chair arms fold into the aisle to provide 7 additional seats. Full headroom. Big interior luggage racks.

Type 25

another grea

Greyhound has just ordered 300 Type 250 Yellows — the largest parlor coach order ever placed by a motor carrier

In announcing to the industry Type 250, Yellow gratefully acknowledges the valuable aid given by Greyhound in the development of this new transcontinental-type parlor coach.

For Type 250 is definitely the result of cooperative effort—the result of combining the practical cross country operating experience of this great transcontinental operator with Yellow's engineering and manufacturing experience.

This coach therefore is destined to meet the demand for a modern parlor coach that will stand the most severe and exacting requirements of de luxe long distance motor coach travel.

It has tremendous power and quick driving response with a rate of acceleration astonishing in a vehicle of this size.

It has unusual hill climbing ability, complete absen
of vibration and irritating valve noise and surprisin
ly small fuel consumption for so powerful an engin

Ease of handling is comparable only to that of
passenger car. The 4-wheel air brakes are by far th
biggest Yellow has ever designed for a coach—th
service brakes alone have 698 square inches
braking area. Maximum safety. Maximum brakin
capacity to take care of sudden emergency stop
Instant response to the slightest touch of the brak
pedal. Quick, sure, *smooth* retardation.

Yellow Coach !

nother outstanding feature is its easy steering and
lity to hold the road at any speed—a direct result
the balanced distribution of weight on the tires.

thout exceeding legal over-all limits there is more
ssenger space in the Yellow 250 than in any other
nventional large capacity intercity coach. Seats
40 inches wide—as wide as those in a railroad
. They are spaced on 34 inch seat centers to
e passengers room to stretch and relax.

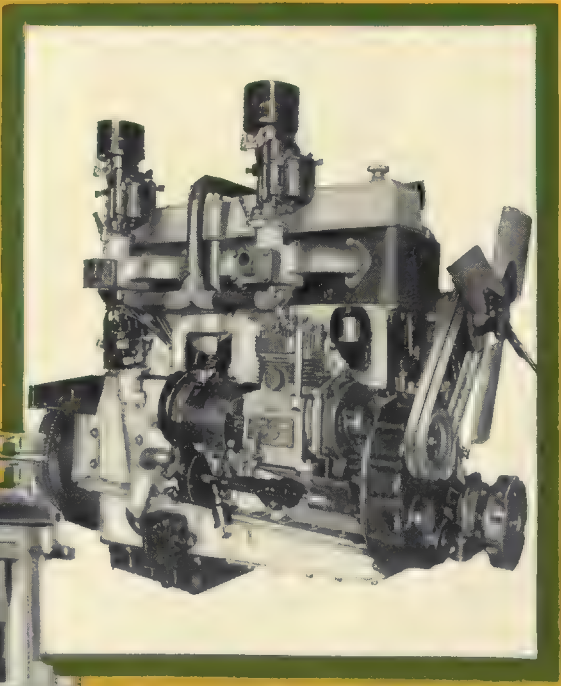
e Yellow 250 has been thoroughly tested in
usands of miles of service, over mountains and
ert country, on the open highway and on the
neral Motors proving ground.

o this coach every known means of insuring pas-
nger car comfort, safety and reliability of opera-
n, extra long life, low maintenance and freedom
m failure has been built in.

Everything that Yellow Coach engineers could do, everything that transcontinental operating experience could suggest, has been included to make it an outstanding achievement in large capacity coach design.

You too will say when you test it—

"A new standard of performance. A new mechanical excellence approaching perfection . . . amazing economy of operation . . . a new conception of earning power."



The big new Yellow "616" Engine develops 150 h.p. at 2,100 R.P.M.—121 h.p. at 1,400 R.P.M. Low engine speed with tremendous power, amazing economy, longer life, less maintenance, greater reliability. Completely free from valve noise and vibration—equipped with Zero-lash automatic valve adjuster and harmonic balancer. Note the compactness and easy accessibility.

The amazing growth of the Greyhound System.

The present great nation-wide network of Greyhound lines had its modest beginning in 1924, less than six years ago. Today, passengers may travel from New York to Los Angeles, from Port Arthur, Canada, to Monterey, Mexico, or to practically any point in America on this one great system.

Greyhound is operating over one hundred million bus miles annually, is providing safe, dependable transportation at economical rates to many millions of travelers, has contributed in a major way to the sound progress and public acceptance of highway transportation and ranks as an outstanding pioneer in the development of vehicle design suitable for continuous and reliable high-speed cross-country service.

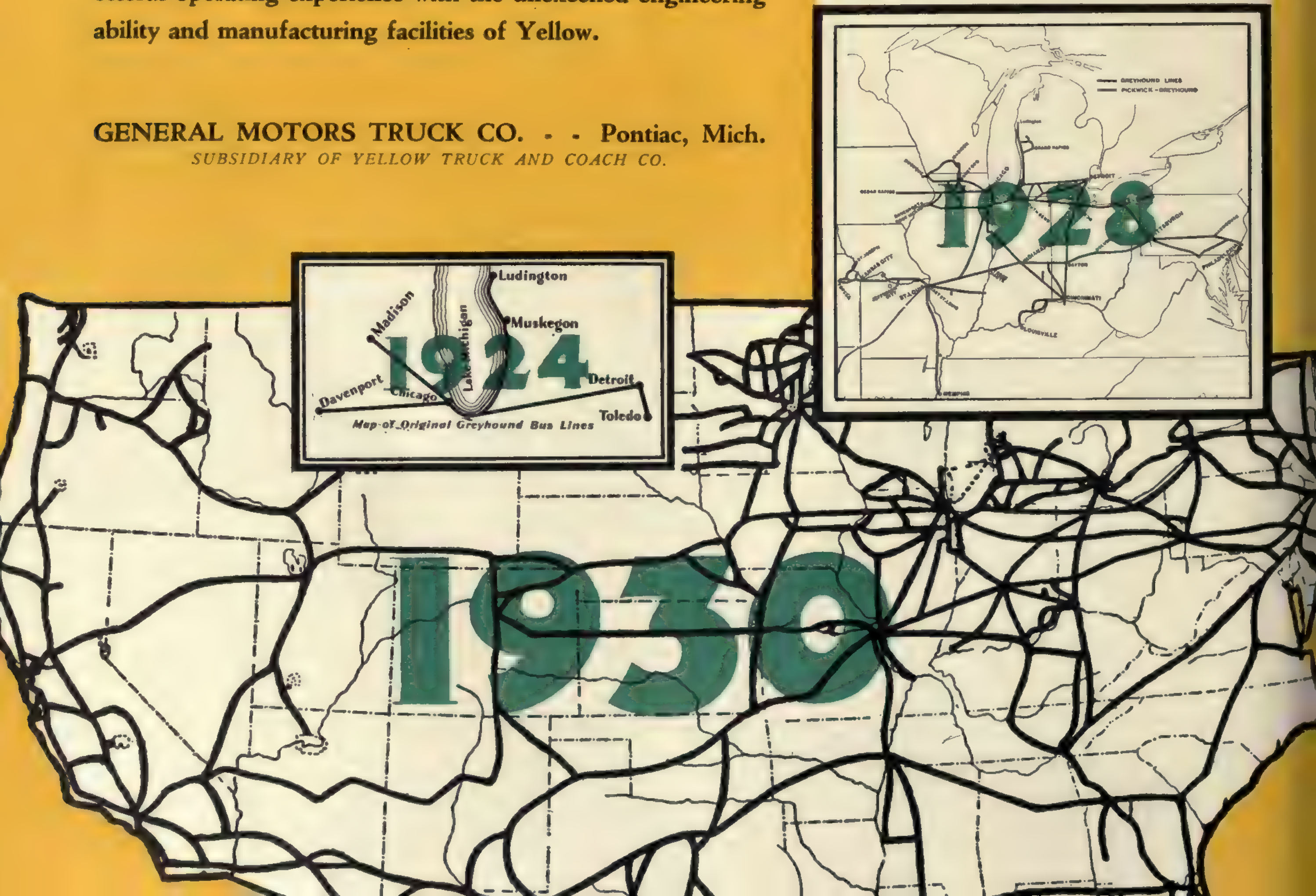
The new Yellow transcontinental parlor coach, Type 250, is definitely the result of combining Greyhound's years of successful operating experience with the unexcelled engineering ability and manufacturing facilities of Yellow.

GENERAL MOTORS TRUCK CO. - - Pontiac, Mich.
SUBSIDIARY OF YELLOW TRUCK AND COACH CO.

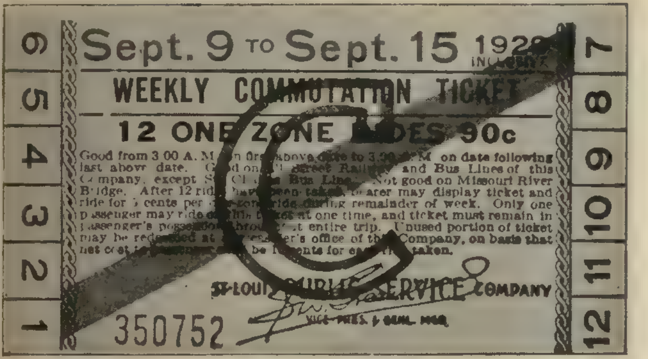
Interesting Facts About Greyhound (1929)

Miles of route	36,000
Revenue bus miles operated	101,000,000
Passengers carried	19,000,000
Gross revenue	$32,000,000
Gasoline consumed, gallons	19,000,000
Salaried employees	3,650
Ticket agents, over	4,000
Garages	102

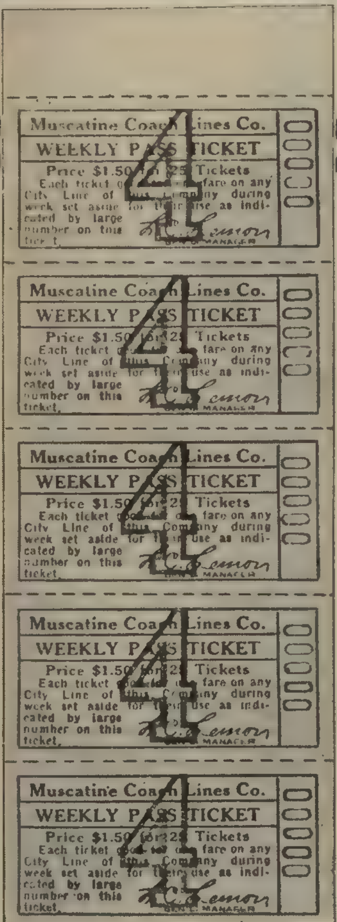
The route maps of the Greyhound lines in 1924 and in 1928 and in 1930 illustrate more graphically than words the amazing growth of this great transportation system.



Salvation—or salvage?


6 5 4 3 2 1
Sept. 9 TO Sept. 15 1929
WEEKLY COMMUTATION TICKET
12 ONE ZONE RIDES 90c
ST. LOUIS PUBLIC SERVICE COMPANY
VICE-PRES. & GENL. MGR.
350752
7 8 9 10 11 12

your fare system may determine the answer


Muscatine Coach Lines Co.
WEEKLY PASS TICKET
Price $1.50 for 25 Tickets
4

Quoting from the recent address of a P. S. C. official in the Middle West:

"Some means must be found to retain the railway. The problem of service at a reasonable cost that at the same time gives the operators a fair return on the value of their property, is one which has confronted every community in this country during the past ten or fifteen years. It still confronts most of them."

Globe-designed Weekly Passes are largely responsible for the jumps into the black by a number of marginal companies. In one case recently made known, the adoption of the Weekly Pass Ticket has actually increased off-peak riding over 400%, and Sunday riding 600%. These figures will be verified if you desire.

Two principal forms are used by various properties. The card type, punched by the operator, and the book tear-out type. Both accomplish the main object—cash in advance, and incentive for the prospective rider to economize by quantity buying.

The book type sells in books of twelve or twenty-five tickets at a substantial reduction in price. It can be *(and is)* used by all members of the family. Tickets left over Saturday are almost invariably used up on Sunday. The riding complex or psychology of this method is highly profitable to the operator.

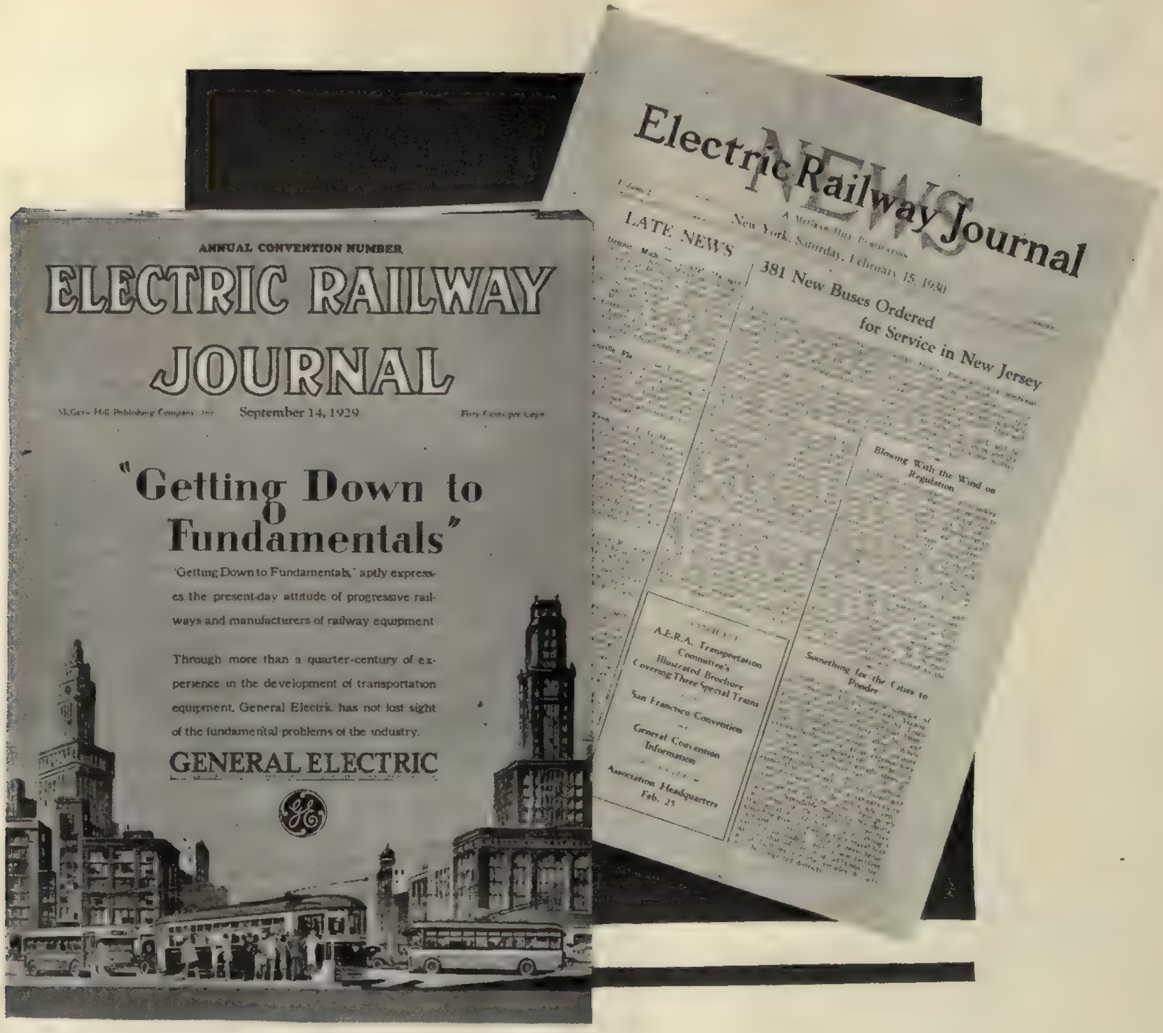
Let us explain this subject in detail. Write or phone nearest office.

Globe

TICKET COMPANY

PHILADELPHIA

Factories:	*Sales Offices:*
Philadelphia Los Angeles Boston New York Jacksonville	Syracuse Cincinnati Pittsburgh Baltimore Cleveland



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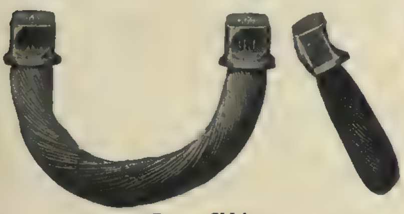

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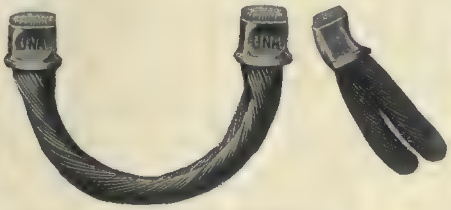

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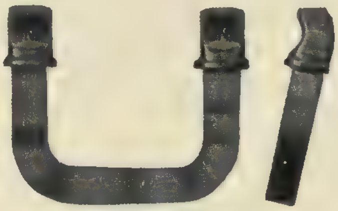

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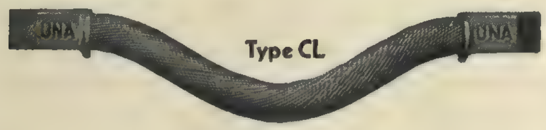

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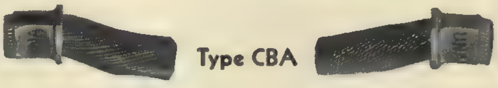

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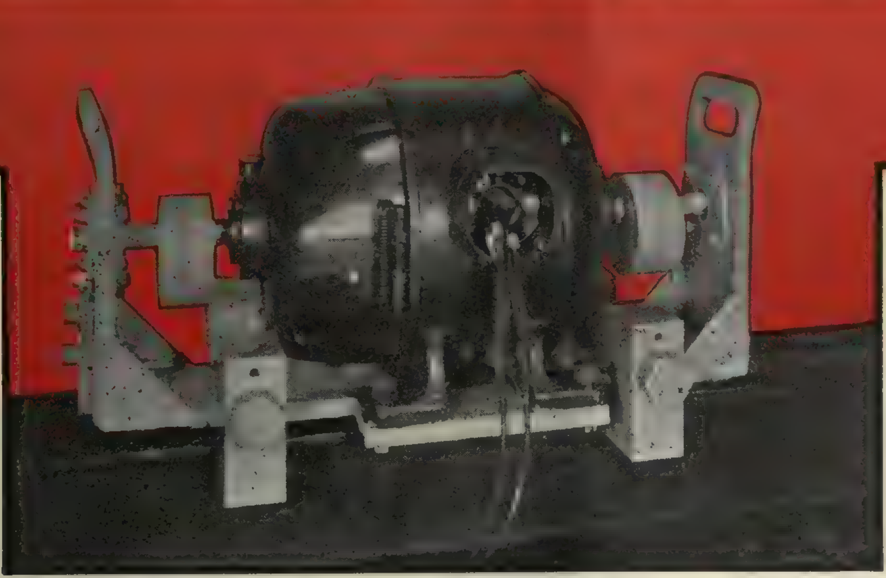

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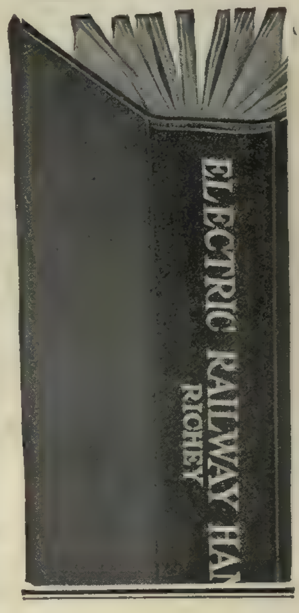

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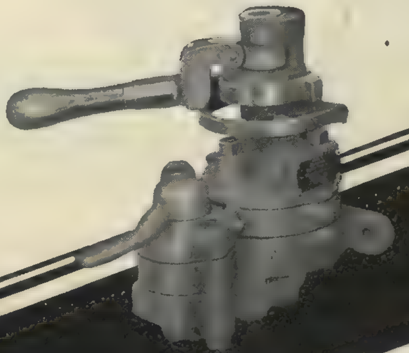

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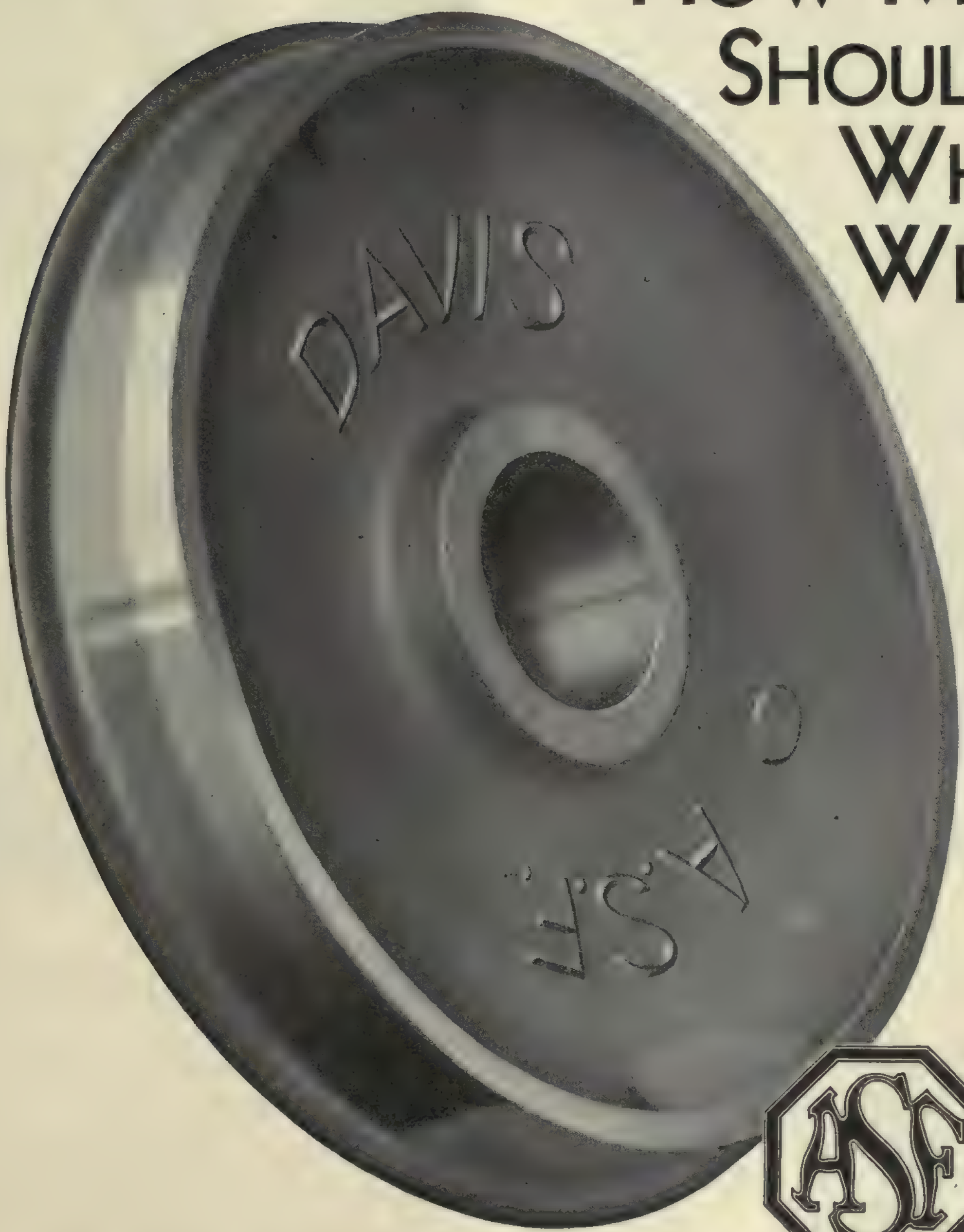

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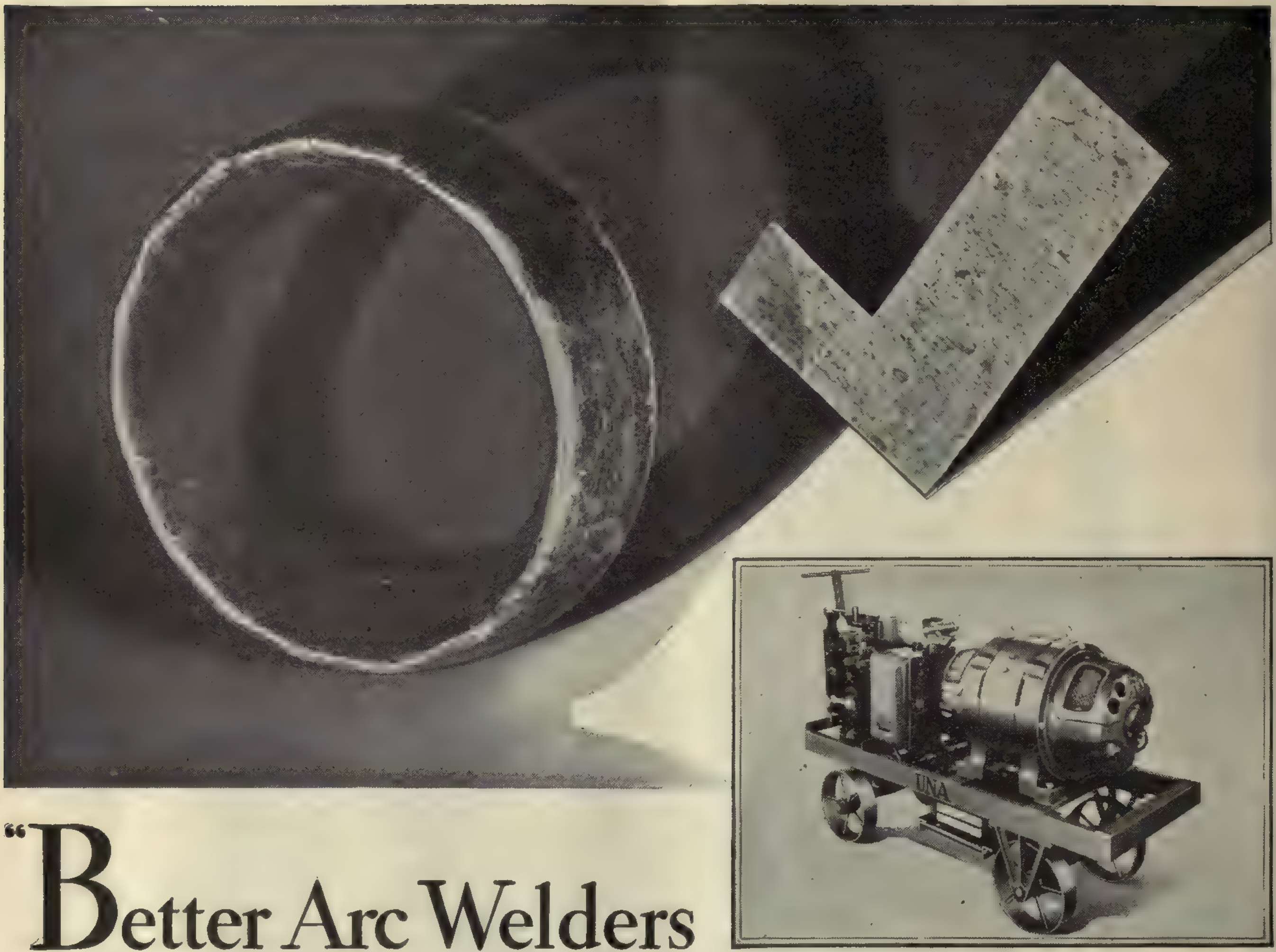

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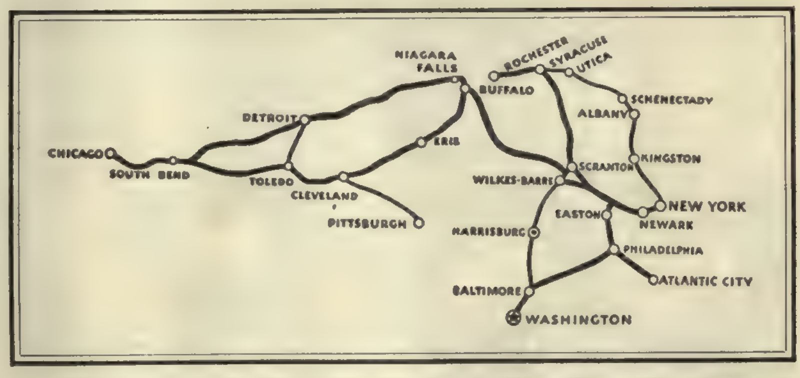

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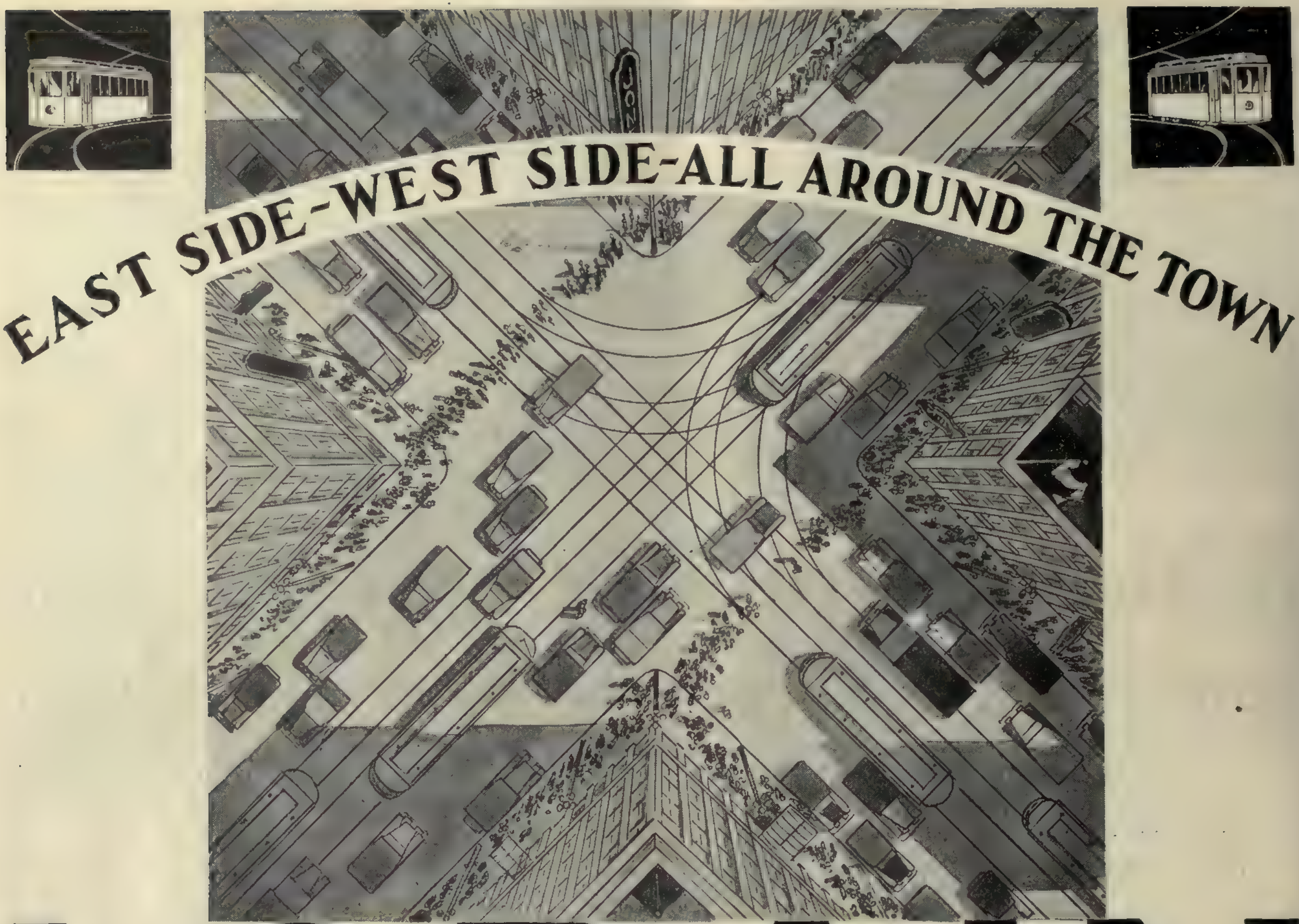
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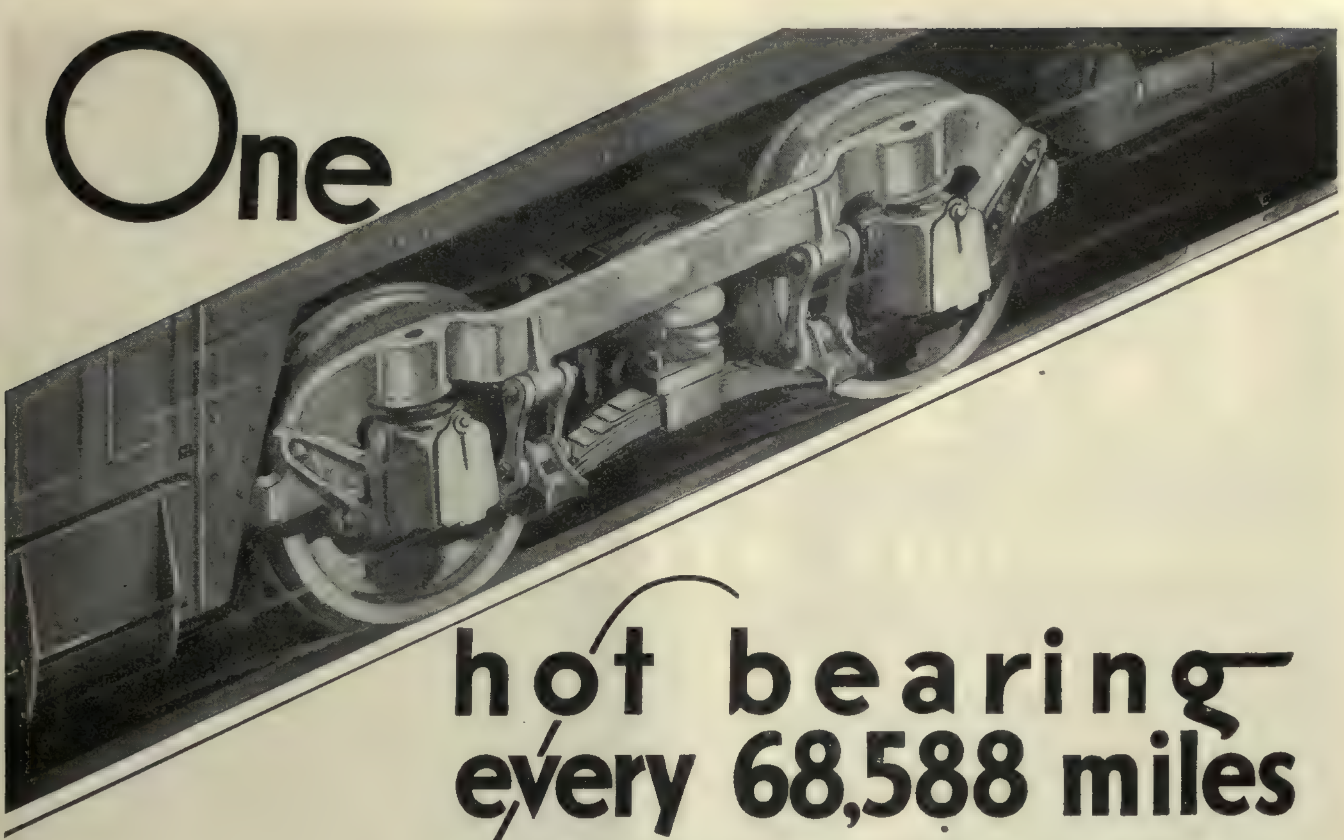

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Lubrication cost 22¢ per M miles

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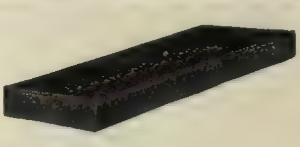

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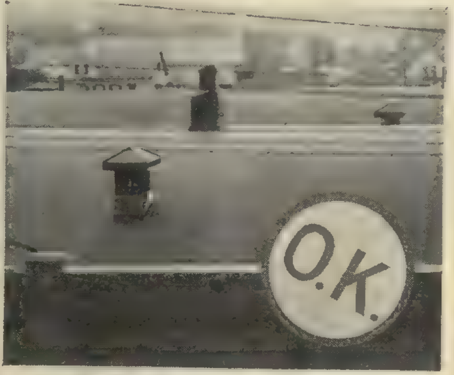

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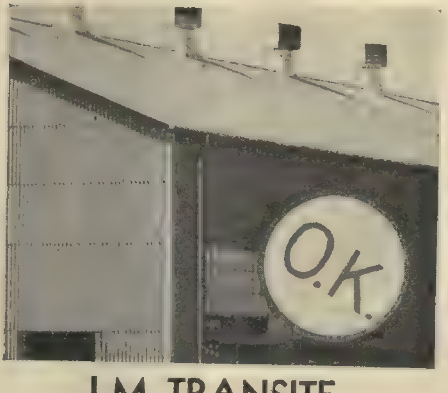

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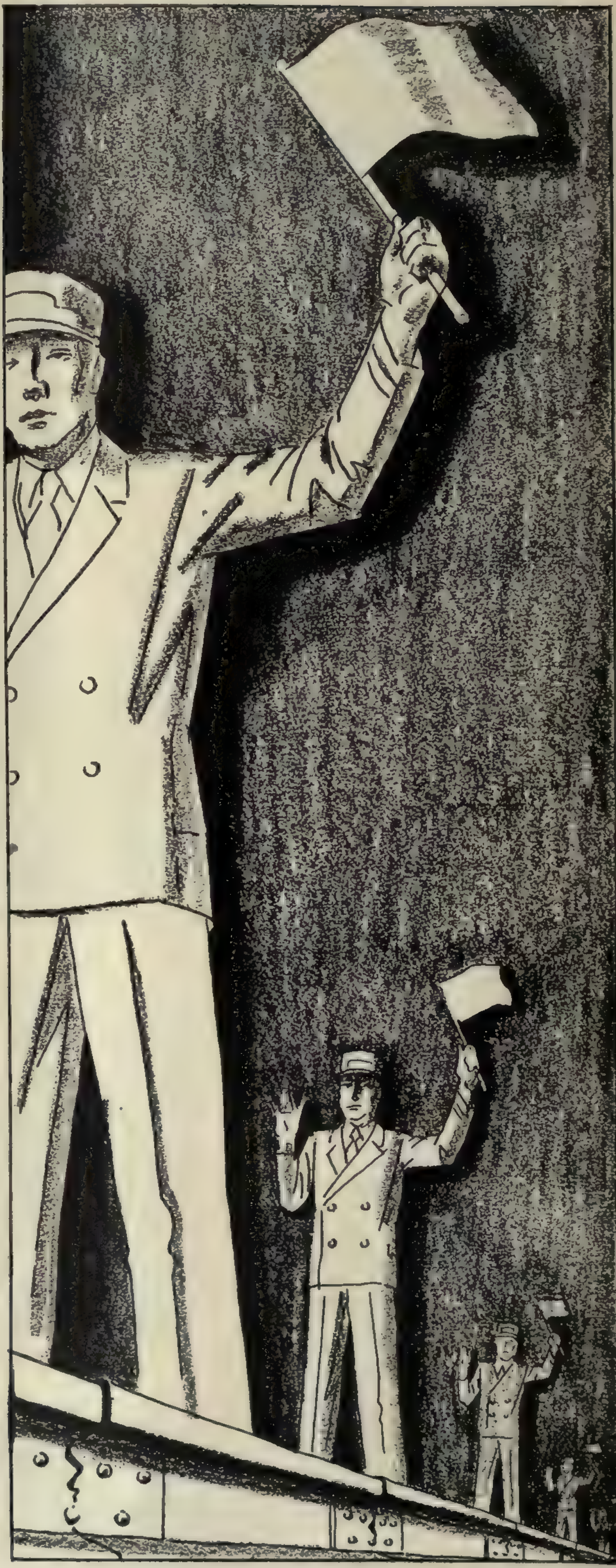

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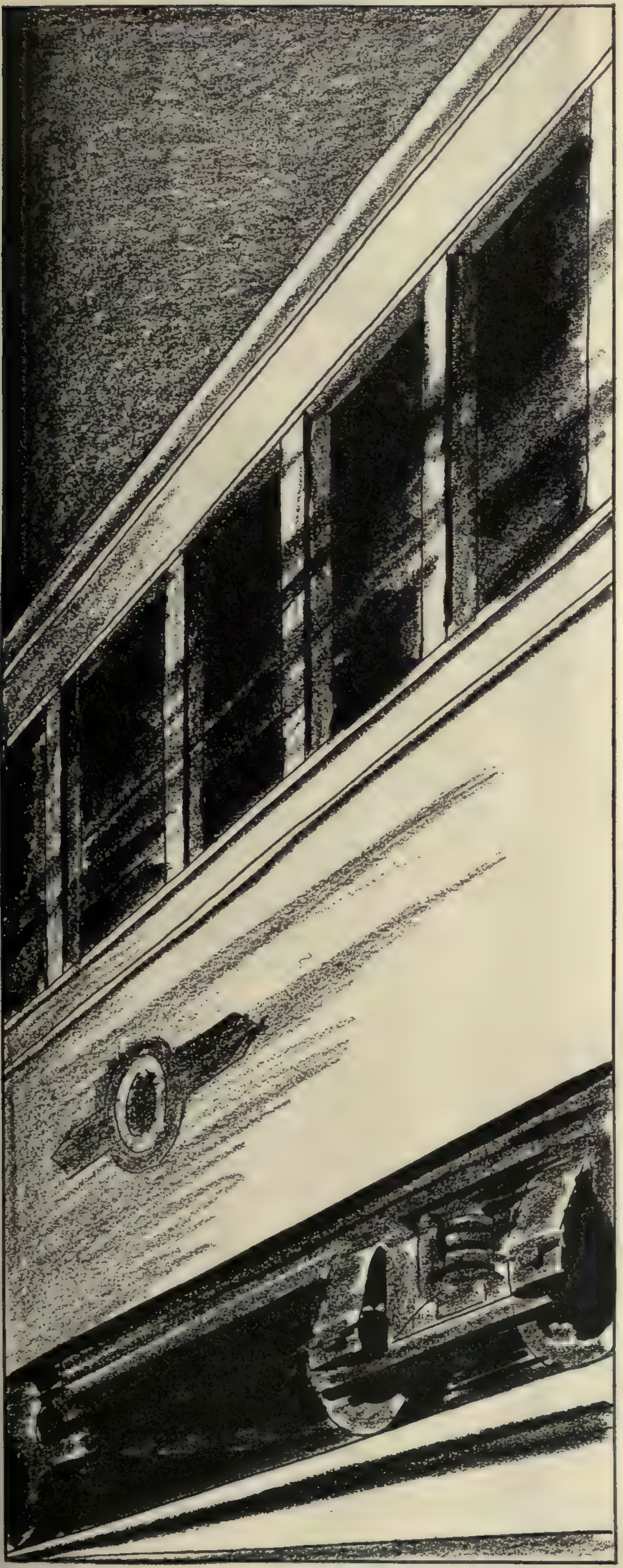

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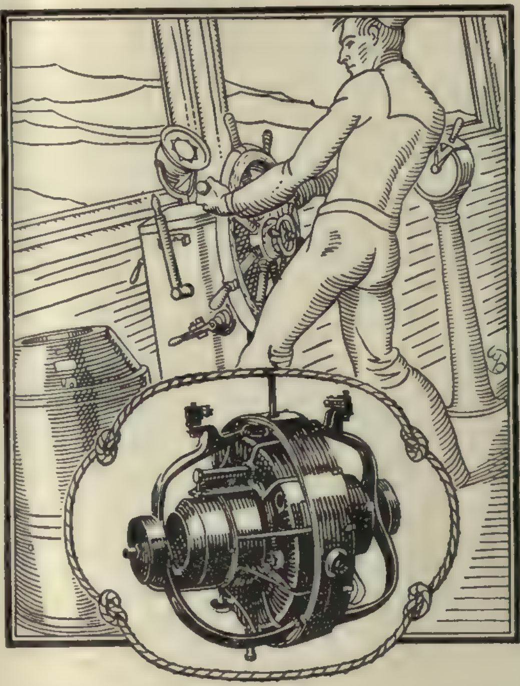

HIGH up in the wheelhouse of a ship there spins a gyroscopic compass, pointing ever at True North. With automatic precision it warns the navigator of the slightest deviation from his course. By its aid he steers his ship unerringly across the waste of waters to its destined port.

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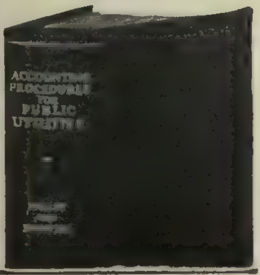

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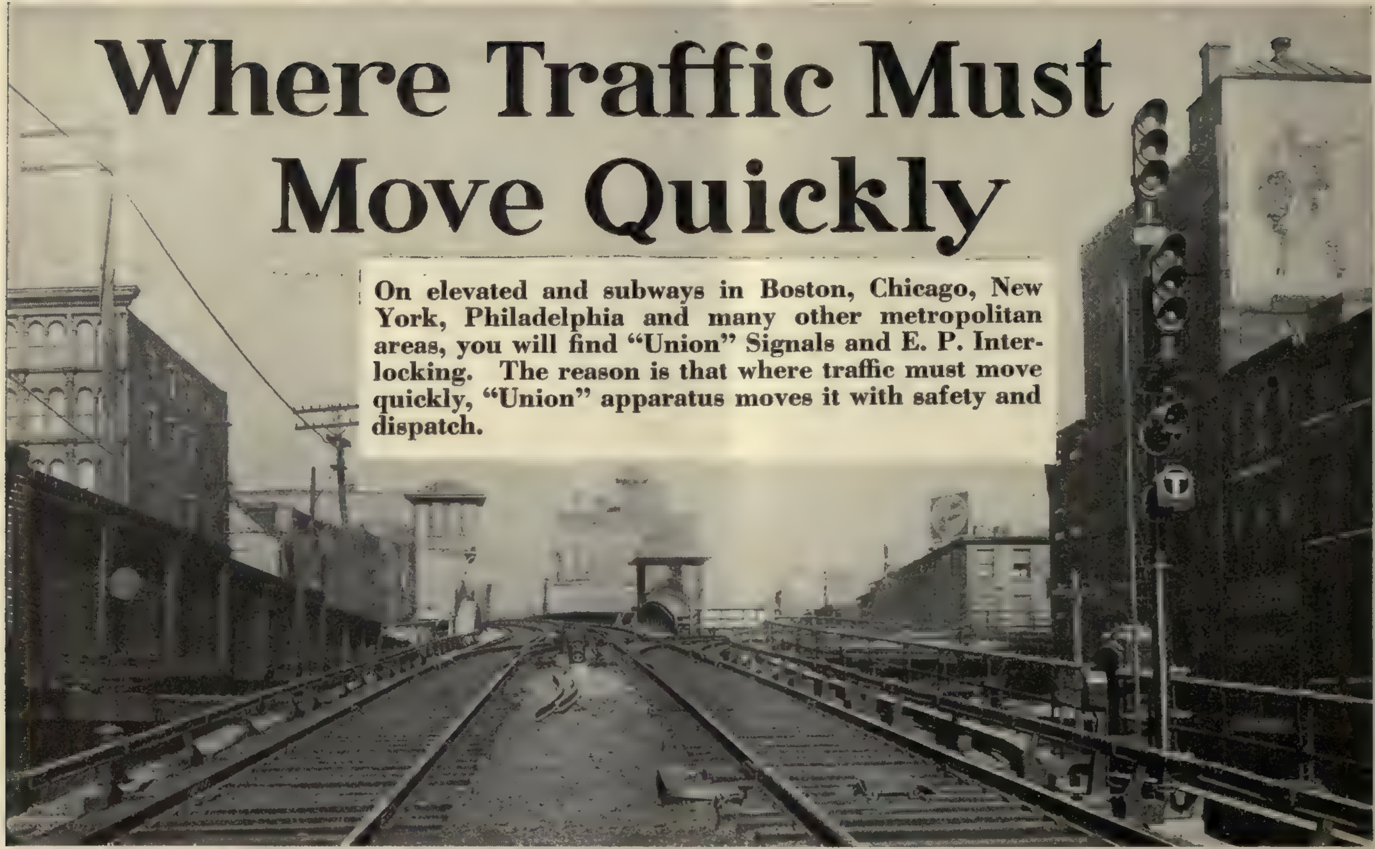

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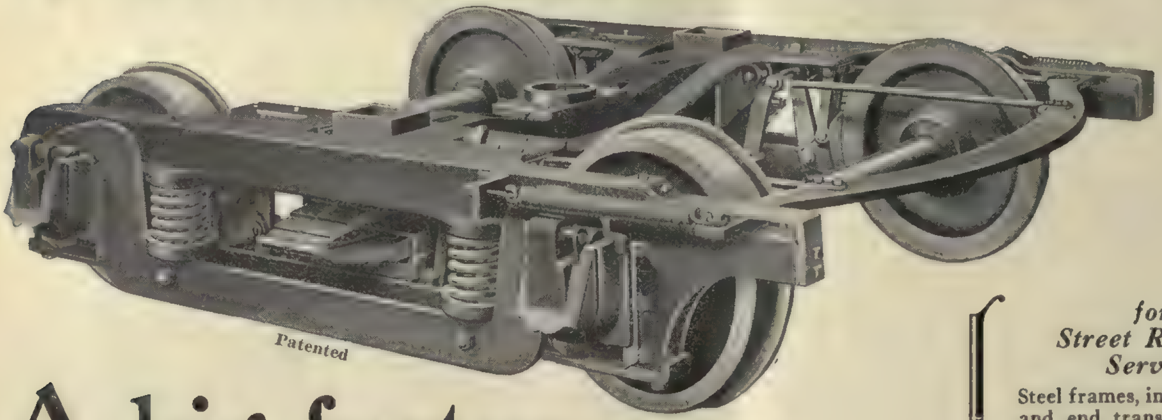

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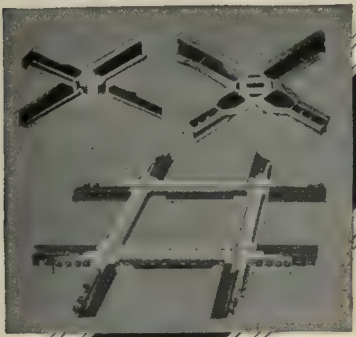

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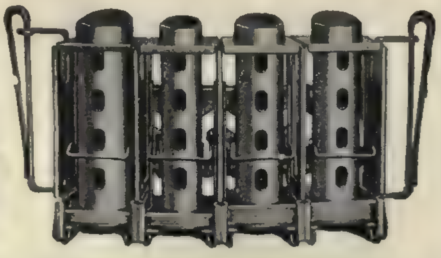

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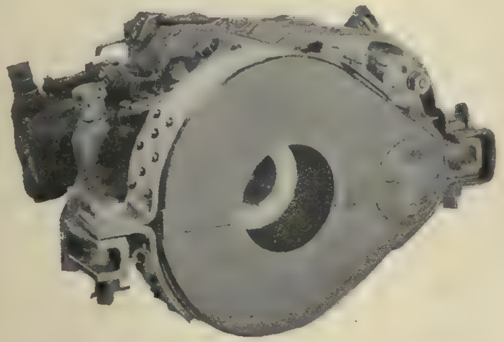

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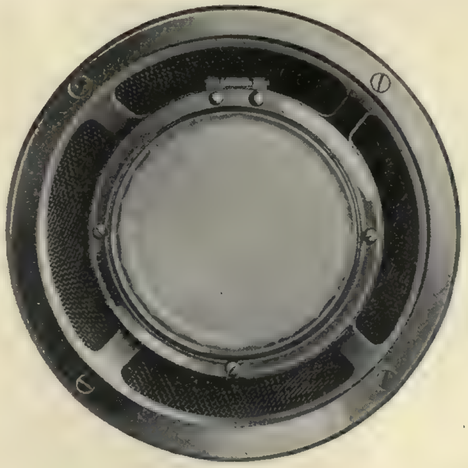

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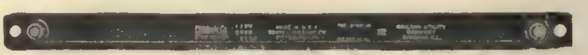

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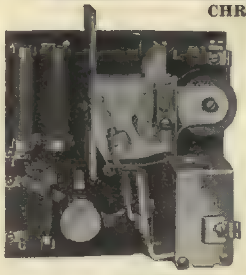

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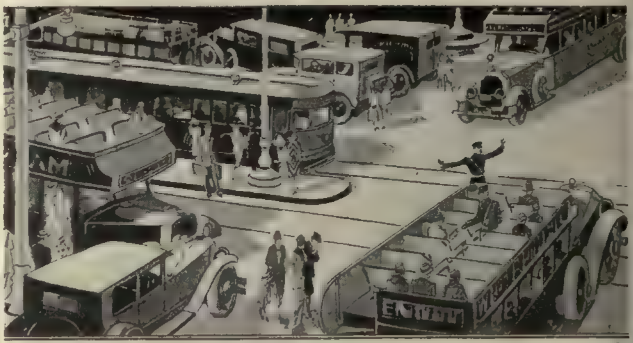

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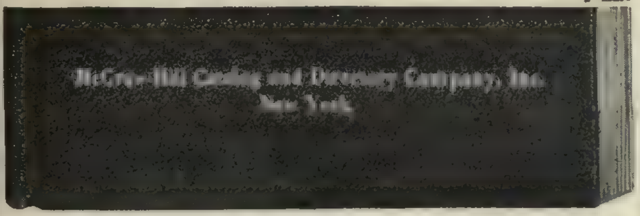

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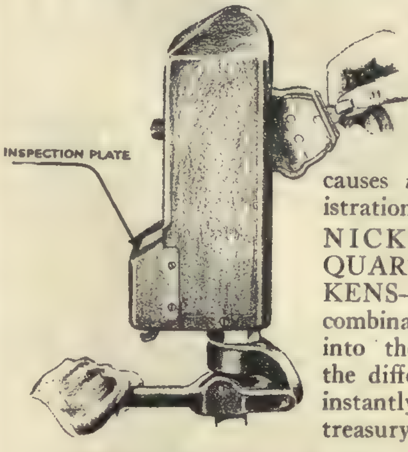

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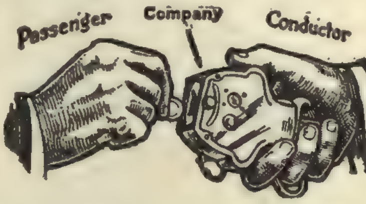

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SEARCHLIGHT SECTION

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Electric Railway Journal, published monthly—12 regular and 1 special, at New York, N. Y., for April 1, 1930.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared C. H. Thompson, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Electric Railway Journal and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Publishing Company, Inc., 10th Ave. & 36th St., N. Y. C. Editor, None. Managing Editor, John A. Miller, Jr., 10th Ave. & 36th St., N. Y. C. Business Manager, Louis F. Stoll, 10th Ave. & 36th St., N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given.) McGraw-Hill Publishing Company, Inc., 10th Ave. & 36th St., N. Y. C., Stockholders of which are: James H. McGraw, 10th Ave. & 36th St., N. Y. C. James H. McGraw, Jr., 10th Ave. & 36th St., N. Y. C. James H. McGraw, James H. McGraw, Jr., and Malcolm Muir, 10th Ave. & 36th St., N. Y. C. Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw. Curtis W. McGraw, 370 Seventh Ave., N. Y. C. Donald C. McGraw, 10th Ave. & 36th St., N. Y. C. Harold W. McGraw, 285 Madison Ave., N. Y. C. Joseph H. Bragdon, 10th Ave. & 36th St., N. Y. C. Anne Hugus Britton, 10th Ave. & 36th St., N. Y. C. Mason Britton, 10th Ave. & 36th St., N. Y. C. Edgar Kobak, 10th Ave. & 36th St., N. Y. C. Grace W. Mehren, c/o Bankers Trust Co., Fifth Ave. & 42nd St., N. Y. C. J. Malcolm Muir & Guaranty Trust Co. of New York, 140 Broadway, N. Y. C., Trustees for Lida Kelly Muir. F. S. Weatherby, 271 Clinton Road, Brookline, Mass. Edwin S. Wilsey, 10th Ave. & 36th St., N. Y. C. Goldman, Sachs & Co., 30 Pine Street, N. Y. C.

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

McGRAW-HILL PUBLISHING COMPANY, INC.
C. H. THOMPSON, Secretary.

Sworn to and subscribed before me this 31st day of March, 1930.

[SEAL] H. E. BEIRNE.

Notary Public N. Y. Co. Clk's No. 97, Reg. No. 1B84. Kings Co. Clk's No. 646. Reg. No. 1089.
(My Commission expires March 30, 1931.)

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Or you are an individual seeking a better position—

ADVERTISE
in the Employment Columns of the
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POSITION VACANT

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POSITIONS WANTED

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RESEARCH engineer with technical training and broad railway experience, qualified to organize research and statistical activties or assist executive on operating, equipment, valuation, franchise, fare and related matters. PW-211, Electric Railway Journal, Tenth Ave. at 36th St., New York.

(Continued on the following page)

SEARCHLIGHT SECTION

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UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

B.J.

POSITIONS WANTED

(Continued from preceding page)

YOUNG man, with ten years' experience, would like position as assistant superintendent transportation. Will go anywhere. PW-209. Electric Railway Journal, Tenth Ave. at 36th St., New York.

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Agents Wanted

For a portable high efficiency electric welder for street railway circuits. Portability such that one man can easily handle the machine on the street. Machine is provided with pneumatic tires and springs so that it can be towed for long distances at high speed. Current consumption from five hundred volt trolley is twelve amperes for two hundred amperes in the arc circuit. Normal welding capacity two hundred amperes; maximum capacity three hundred amperes. Write to the Economy Electric Products Co., 2400 Woodland Ave. Cleveland, O.

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JOSEPH HYMAN AND SONS, Tioga, Livingston and Almond Sts., Philadelphia, Pa., have issued their new catalog, containing specifications, with quotations, of stamping presses, rebuilt in their shops and sold under their guarantee. This catalog is a valuable source of information to buyers and copy is available upon request.

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire railroads and street railways. Also industrial and public service properties which have ceased operation. We furnish expert appraisals on all such properties.

May We Serve You?

The Perry, Buxton, Doane Company

(Capital $1,000,000.00)

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.

Pacific Sales Office—Failing Building, Portland, Oregon

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Electric Railways in Their Entirety

HIGHEST PRICES PAID

DISMANTLING DONE BY US

The Allite Corporation

636-638 Broadway, New York, N. Y.

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DISMANTLING

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Condition Strictly First Class

For Particulars Apply

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Empire Bldg., Pittsburgh, Pa.

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FROM 173 BIRNEY CARS

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Built by J. G. Brill Co.; Brill 79 E-1 Trucks; Full Safety Devices.
Either Westinghouse No. 508 or Gen. Elec. No. 264 Motors.
Complete with all appurtenances.

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All equipment and supplies of the
Auburn & Syracuse Railroad Company,
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We have purchased all the physical property of this road and now offer at very attractive prices, the following:—

Light Weight Double Truck Cars
Double Truck Interurban Cars
Snow Plows and Sweepers
Freight Cars
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Caldwell Wheel Press
Wheel and Engine Lathes
Boring Mill
Peter Smith Car Heaters
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Motors:
76—12-A
101B—264-A
121 —200-J
Controllers:
K-6 K-10
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Compressors:
D I EG
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H. E. SALZBERG COMPANY, INC.
225 Broadway — Estd. 1898 — New York City, N. Y.

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SEARCHLIGHT SECTION
for Equipment-Opportunities
G-3A

New "SEARCHLIGHT" Advertisements

must be received by 5 P.M. the 20th of the month to appear in the issue out the following month.

Address copy to the Searchlight Department
Electric Railway Journal
Tenth Ave. at 36th St., New York City

FOR SALE

1—42-in. **Putnam** Double End **Car Wheel Turning Lathe.**
1—150-ton **Niles** Hydraulic **Car Wheel Press.**
1—300-ton **Niles** Hydraulic **Car Wheel Press.**
Several **Niles & Putnam Axle Lathes** and **Car Wheel Boring Machines.**

CENTRAL ILLINOIS EQUIPMENT CO.
Springfield, Ill.

Operation discontinued put this equipment in the bargain class . . . all of it was in operation until March 31, 1930.

We know that you can get many years of profitable operation out of the equipment listed here. Every item is in good condition. Must be seen to be appreciated.
As for prices, we will let you pass judgment. However, we don't believe you can get the same value at twice the prices we ask.

Substation Equipment

3—Rotary Converters. G.E., Serial Nos. 416420, 416451 and 416470, Type TC6, Form P, 300 kw., 60 cycles, 600 volts, 1200 r.p.m., 500 amp., with transformers, reactance coils, and panels complete.

4—Rotary Converters, G.E., Serial Nos. 146388, 146389, 146487 and 146488, Type TC6, Form P, 200 kw., 60 cycles, 600 volts, 1200 r.p.m., 333 amp., with transformers, reactance coils, and panels complete.

3—Transformers, 150 kva., G.E., Type H, Form KD, 60 cycles, 11,000 / 22,000 to 2200 volts. **Outside type.** Serial Nos. 2120537, 2181781 and 3191513.

4—Transformers, 145 kva., G.E., Type H, Form RP, 60 cycles, 11,000 / 22,000 to 2200 volts, single phase, oil cooled; step-up.

1—Automatic Switching Equipment for reclosing the service on D.C. circuit, G.E. Catalog 196600 combined stud end and multiple feed. Wiring arrangement P2199183, v. 600 amp. 450, summary K2639317, requ Sye 77023. (Practically new.)

Oil Switches and Panels, Rotary Converter Panels, D.C., Feeder Panels, Starting Panels, Lightning Arresters and Choke Coils, Disconnecting Switches.

Cars

3—Birney, each with 2 G.E. 264 Motors, K-63 Controllers, 27-B-7 Compressor.

4—With G.E. 258 Motors, K10A Controllers.

6—Double end operation, 8 wheel, steel I beam underframes, each with 4 G.E. 87 (60 hp.) Motors, Type M (multiple unit) Control, Westinghouse Air Brakes, with SME emergency. Trucks, standard C-55. Heating, hot water. Cars 48 ft. long, seating capacity 52.

1—Work Car, 48 ft. long, MCB couplers, same motors, etc. as last item.

1—Snow Plow, on four wheels.

Track

3500 Tons

80-lb. A.S.C.E. Section Steel T Rails, 33-ft. lengths, uniform drilling, rail drilling 2x7 in. for ⅞ in. track bolt. Full quota angle splice bars.

34 Turnouts, complete, No. 8 Frogs 15 ft. long, 15-ft. Switches, 8 ft. 3 in. Guard Rails, Ramapo Stands.

Selected Track Materials. Almost as good as new.

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Note: *This is but a partial list of all the equipment purchased by us from the Elmira, Corning and Waverly Railway.*

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50 Church St., New York, N. Y.
Telephones: Cortlandt 3322-3

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IN
WORTH

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Years of intelligent fruitful experience

OUR FOREGROUND . . .
Modern—scientific—progressive methods

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and
DISMANTLE
RAILROADS

THE JOSEPH SCHONTHAL CO.
Columbus, Ohio

References:
The Chase National Bank, New York
The Marine Trust Co., Buffalo
The Huntington Nat'l Bank, Columbus

It

IN just six weeks the A.E.R.A. Convention meetings will be under way in San Francisco but the exhibits will be found only in the Convention and Exhibit Number of *Electric Railway Journal* that appears June 14th.

The editorial pages will tell of the trend and developments in equipment that are contributing, toward greater comfort, safety, speed . . . better appearance, operation and maintenance. The advertising pages will show what each manufacturer has to contribute toward these ends.

For the thousands who have to stay at home (unfortunately everybody

A. E. R. A. CONVENTION
San Francisco
JUNE 23-26

won't be long now!

can't go to San Francisco!) the Convention Exhibit and Convention Report Numbers of *Electric Railway Journal* will represent the exhibits, meetings, new developments, new business relationships, all the interest and enthusiasm that go to make up these annual meetings.

The fact that there will be no Convention Exhibits this year places a larger responsibility on *Electric Railway Journal*, but we feel certain of the whole-hearted support of manufacturers in our effort to place before the whole industry as complete a picture as possible of this year's Convention.

More than a million dollars a day is budgeted to be spent this year. Advertising should bring better results than ever before!

Some of the discussions planned for the Convention Number

Industry leaders are planning to discuss the following subjects in the Convention Number of *Electric Railway Journal*:

> **Developing Better Cars, Increasing Speed of Operation, Providing Greater Comfort, Reducing Vibration and Noise, Building Better Track, Making Cars More Attractive in Appearance, Improving Riding Qualities of Trucks, Promoting Safety, Progress in Trolley Bus Design, Modern Machinery for Improving Maintenance, Better Equipment for Freight Handling, Meeting the Power Demand, Facilitating Fare Collection, Improving the Bus to Increase Its Usefulness, Advancement in Structural Design of Vehicles, Increasing the Efficiency of Rapid Transit, Serving the Suburban Commuter.**

All, you will admit, pertinent to the editorial theme, "Improving Design to Improve Transportation Service."

Electric Railway Journal

CONVENTION and EXHIBIT NUMBER

(FORMS CLOSE JUNE 4)

CONVENTION---REPORT NUMBER

(FORMS CLOSE JUNE 24)

Competent to solve cleaning problems

ASK us about your car and motor repair cleaning problems that seem to defy solution. From our long experience in serving electric railway systems, we can suggest suitable Oakite materials and methods for overcoming the difficulty.

Our nearest Service Man will gladly study your cleaning requirements and recommend the most effective and economical Oakite material for saving time and effort in cleaning cars, large and small truck and brake parts, motor parts, etc. A postal to us will bring him to your shop.

Manufactured only by
OAKITE PRODUCTS INC., 28B Thames St., NEW YORK, N.Y.

Oakite Service Men, cleaning specialists, are located at

Albany, N. Y.; Allentown, Pa.; *Atlanta, Baltimore, Battle Creek, Mich. *Boston, Bridgeport, *Brooklyn, N. Y.; Buffalo, *Camden, N. J.; Charlotte, N. C.; Chattanooga, Tenn.; *Chicago, *Cincinnati, *Cleveland, *Columbus O.; *Dallas, *Davenport, *Dayton, O.; Decatur, Ill.; *Denver, *Des Moines, *Detroit, Elmira, N. Y.; Erie, Pa.; Fall River, Mass.; Flint, Mich.; Fresno, Cal.; *Grand Rapids, Mich.; Harrisburg, Pa.; Hartford, *Houston, Texas; *Indianapolis, *Jacksonville, Fla.; *Kansas City, Mo.; *Los Angeles Louisville, Ky.; Madison, Wis.; *Memphis Tenn.; *Milwaukee, *Minneapolis, *Moline, Ill.; *Montreal, Newark, N. J.; Newburgh, N. Y.; New Haven, *New York, *Oakland, Cal.; *Oklahoma City, Okla ; *Omaha, Neb.; *New Orleans, La.; *Philadelphia, Phoenix, Ariz.; *Pittsburgh, Pleasantville, N. Y.; Portland, Me.; *Portland, Ore ; Poughkeepsie, N. Y.; Providence Reading, Pa.; Richmond, Va.; *Rochester, N. Y.; Rockford, Ill.; *Rock Island, Sacramento, Cal.; *San Francisco, *Seattle, South Bend, Ind.; Springfield, Mass.; *St. Louis, *St Paul, Syracuse, N. Y.; *Toledo, *Toronto, Trenton, *Tulsa, Okla.; Utica, N. Y.; Williamsport, Pa.; Worcester, Mass.; Youngstown, Ohio.

*Stocks of Oakite materials are carried in these cities.

OAKITE
TRADE MARK REG U S PAT OFF
Industrial Cleaning Materials and Methods

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This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

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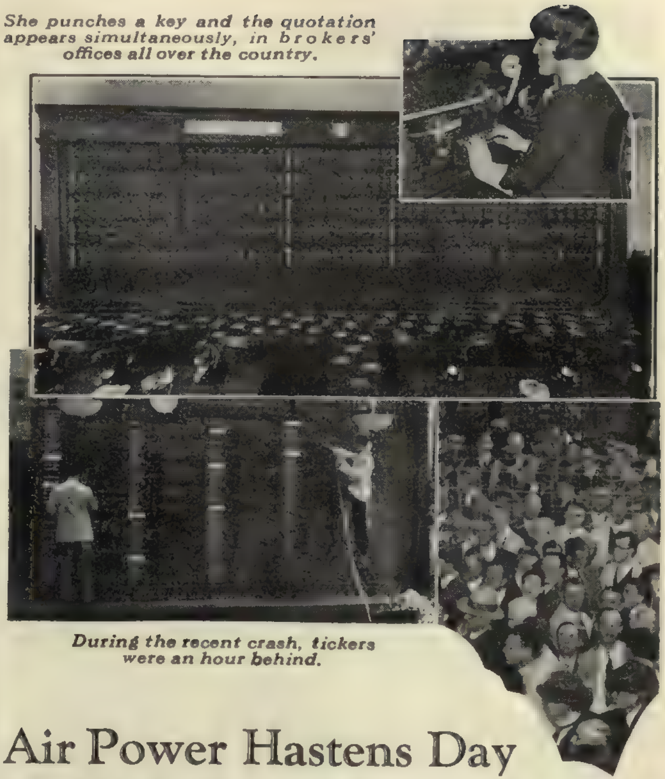


She punches a key and the quotation appears simultaneously, in brokers' offices all over the country.

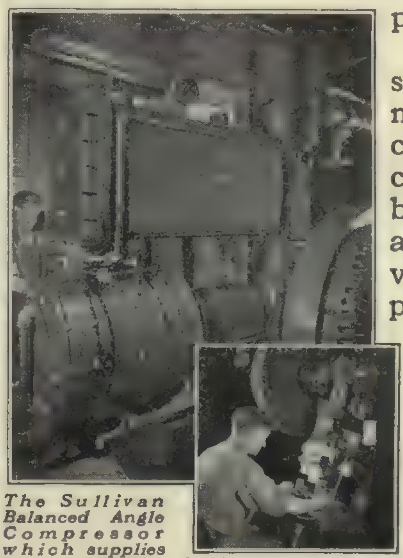
During the recent crash, tickers were an hour behind.

Air Power Hastens Day of High Speed Stock Reports

New Automatic brokers' boards are being turned out rapidly. Soon they will record quotations simultaneously all over the country. One girl at a keyboard will post prices at hundreds of points at once—smashing all precedent in speed and accuracy.

Armatures for the boards are being broached rapidly, in air punches. Numbers are being sprayed on them with air—which will soon spell profit or loss to traders. Coil cores are blown from presses, with air.

Every production shortcut, and every machine which could cut time and costs on the new boards, has been adopted. And a vital factor is air power by Balanced Angle Compressors—the choice of leaders in every industry.



The Sullivan Balanced Angle Compressor which supplies low cost air power for building the new automatic quotation boards.

Send for Booklet 83-W

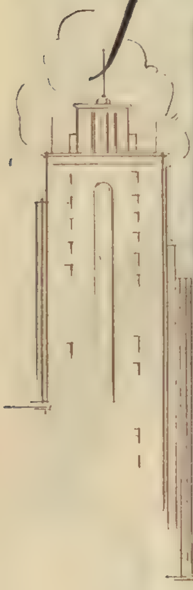
SULLIVAN

SULLIVAN MACHINERY COMPANY

809 Wrigley Bldg., Chicago

Offices in all principal cities of the world

25 Passenger BENDER
PALACE HYWAY COACH
Big Unit Rider Appeal...Small Unit Economies



THE famous Bender Palace Hyway Coach is now available in twenty-five passenger seating capacity.

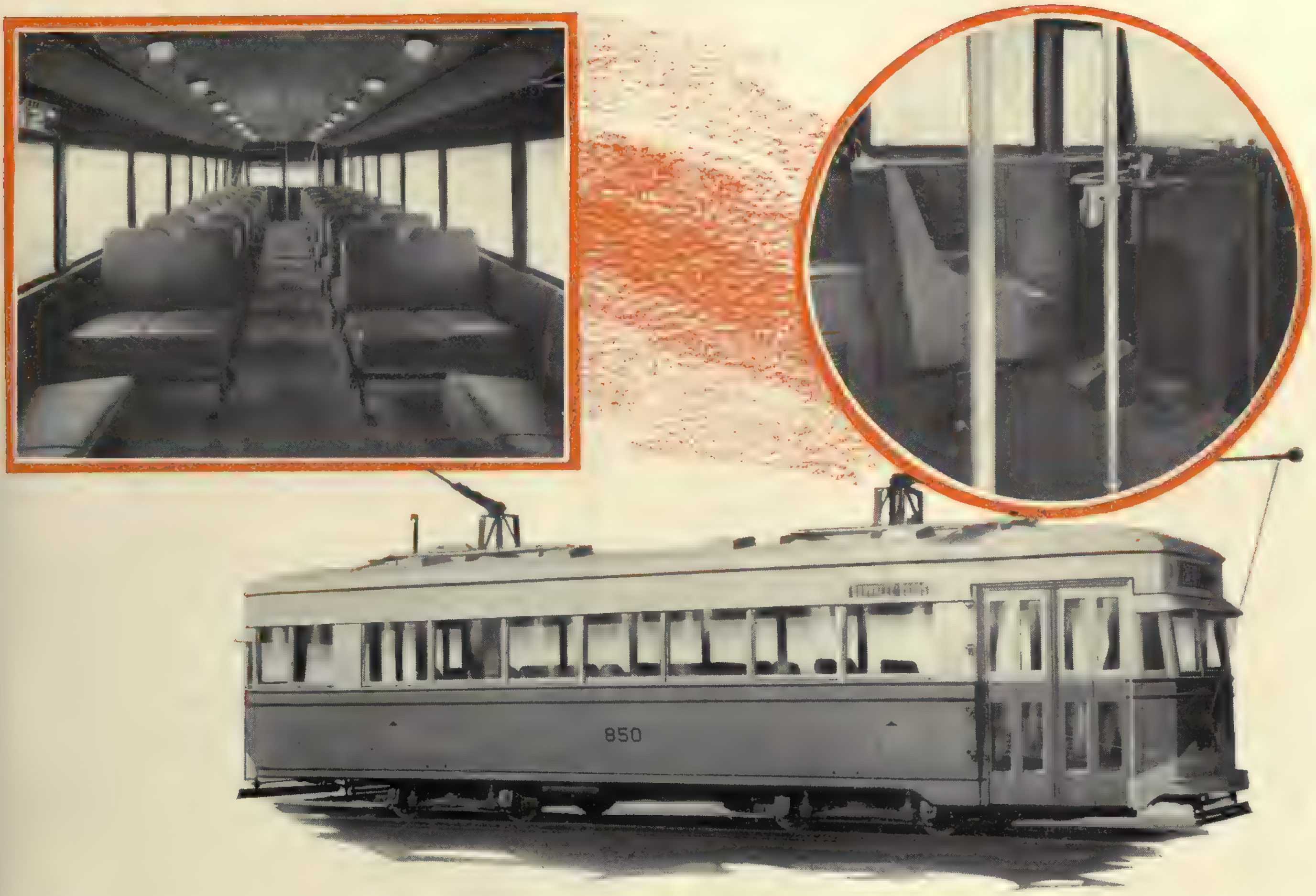
Five auxiliary aisle chairs and two passenger tilt seats alongside driver increase the seating capacity to thirty-two.

This unit incorporates all the features which have made the Bender Palace Hyway Coach so popular, such as the large *inside* overhead luggage galleries, full head room in aisle, wide commodious interior, low maintenance costs, and advanced modern construction.

May we send you further particulars?

THE BENDER BODY COMPANY
W. 62nd and Denison - Cleveland, Ohio

BENDER
BODIES



Youngstown Turns to

Brill MASTER UNIT Cars

Youngstown needed new equipment. And it was only logical that cars "up-to-the-minute" in design and equipment would be selected. The distinctive and particularly attractive stream lines of the Brill MASTER UNIT design appealed, and the purchase of thirteen of the double-end city type resulted.

A combination of light weight, 35 H.P. high-speed motor equipment with W-N double reduction gear drive, foot control, and automatic foot braking makes possible unusually high rates of acceleration and deceleration accomplished in a smooth and comfortable manner. Faster schedules with equipment possessing necessary passenger appeal, particularly designed with wide single sash, low ceiling, automotive type front and with every consideration given to passenger comfort on Brill No. 201-C leather-upholstered seats prompted the selection of these new cars. They are 40 ft. 6 in. long over platforms, and seat 45 passengers.

The ever popular Brill 177-E-1-X Trucks assure long and satisfactory service with minimum maintenance. Complete details furnished upon request.

THE J. G. BRILL COMPANY

PHILADELPHIA

American Car Company
St. Louis

The G. C. Kuhlman Car Co.
Cleveland

Wason Manufacturing Company
Springfield, Mass.

Pacific Coast Representative
Rialto Bldg., San Francisco

The handwriting on the wall—clear, easy to read, logical.

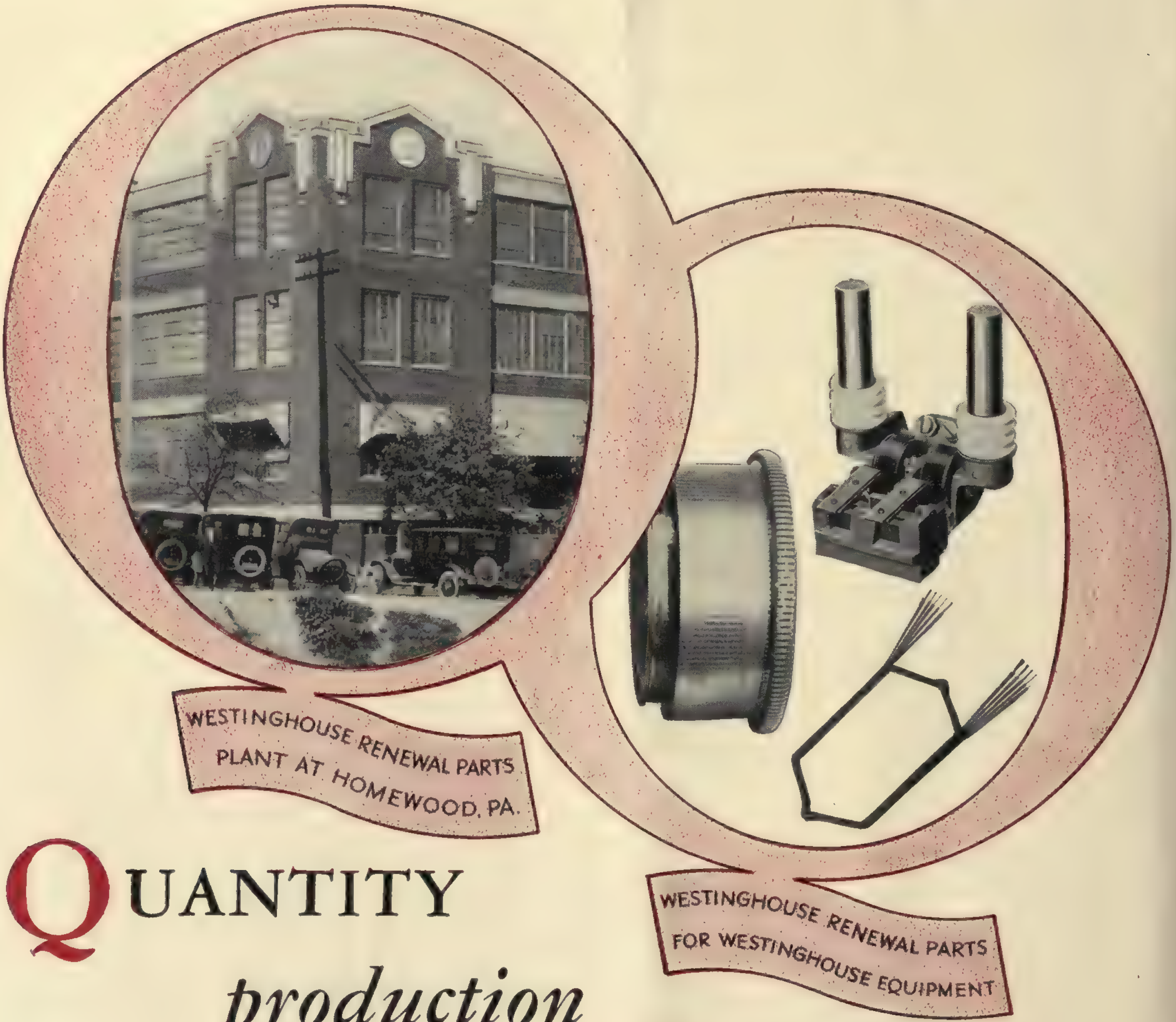
• The Timken-Detroit Axle Co. has identified itself constructively with the profitable future of the electric railway industry.

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

ELECTRIC RAILWAY JOURNAL

w-Hill Publishing Company, Inc. JUNE, 1930 Thirty-five Cents per Copy

Twin Coach
76
Modernizes Without Changing Method of Propulsion
Fits your maintenance system. Provides automotive comfort
Supports and Retains Advantages Of Central Power Station
Noiseless ✓
Loads from Curb ✓
Odorless ✓


WESTINGHOUSE RENEWAL PARTS
PLANT AT HOMEWOOD, PA.
WESTINGHOUSE RENEWAL PARTS
FOR WESTINGHOUSE EQUIPMENT

QUANTITY *production makes* QUALITY *practical*

THE Westinghouse Company, realizing the necessity of segregating the manufacture of *Renewal Parts* from that of complete apparatus, to better serve the industry, established the Homewood Works in 1921.

This plant, manufacturing Renewal Parts for apparatus used throughout the world, produces in quantity, whereas the individual operator is limited by his own needs.

Its large scale operations make possible the development and application of methods and machinery for the production of modern Renewal Parts, giving the industry better parts at economical prices.

A total manufacturing area of 200,000 square feet has been provided to meet the present and future needs. This is the only plant of its kind in the world.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

WESTINGHOUSE ELECTRIC

T 31303

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

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Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY
JOSEPH R. STAUFFER

JOHN A. MILLER, JR., *Managing Editor*

Vol. 74, No. 6 *Pages 301-354*

PAUL WOOTON
Washington
ALEX MCCALLUM
London, England

LOUIS F. STOLL
Publishing Director

Two Big Issues!

The Annual
Convention Number
JUNE 14

Advancing the thought of the industry on equipment design

and the

Convention
Report Number
JULY ISSUE

Containing a complete interesting report of the San Francisco meeting.

McGraw-Hill
Publishing Company,
Inc.

Tenth Avenue at 36th Street
New York, N. Y.

CABLE ADDRESS:
"MACHINIST, N. Y."

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WASHINGTON, *National Press Building*
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DETROIT, *2-257 General Motors Building*
ST. LOUIS, *Bell Telephone Building*
SAN FRANCISCO, *883 Mission Street*
LOS ANGELES, *632 Chamber of Commerce Bldg.*
LONDON, *6 Bouverie Street, London, E. C. 4*

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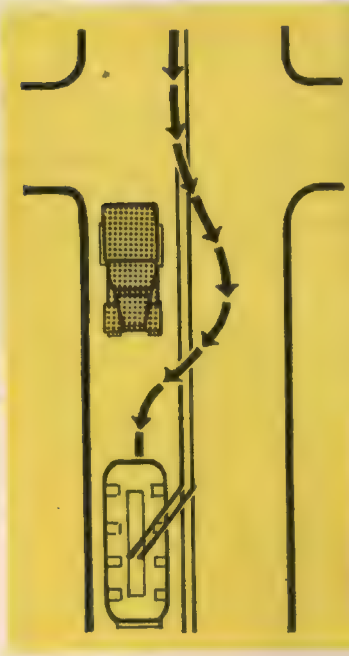
CHICAGO expands 41 ELECTRIC TROLLEY

Twenty-nine of the above Twin Coach electric buses are operating in Chicago. Notice the flexibility which permits the bus to swing to the right or to the left as conditions require.

Weaving in and out from the curb, dodging slow street traffic, all prove the value of the trolley bus in keeping fast accurate schedules and satisfied patrons.



**Westinghouse as a pioneer and leader in trolley bus application will be pleased to work out your problem with you.*

its service with

BUSES . . . . .

THE largest fleet of trolley buses on this continent is being successfully operated by the Chicago Surface Lines in feeder service.

This new form of local transportation was installed on Diversey Avenue on April 12, 1930 and has been extended to other lines to the great satisfaction of both riders and operators.

Objectives sought for years by traffic engineers are now accomplishments. Among these are:

1. Noiseless operation.
2. Flexibility—can detour 10 feet on each side of center.
3. No offensive exhaust gases for passengers or pedestrians to breathe.
4. Powered with two 50-hp. electric motors insuring high speed and a more rapid and smoother pick up than that of the gasoline bus.
5. Extreme reliability of operation because of electric equipment.
6. Looks like a street car, but has the riding qualities of an expensive automobile.
7. Highly efficient use of street space.

Westinghouse high-speed type 1426, 50-hp. motors and type VA automatic foot-operated control are essential features of these most satisfactory transportation vehicles.*

Westinghouse equipment can be applied to any manufacturer's trolley bus chassis.

Flexibility of movement in traffic is one of the major advantages of the trolley bus.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

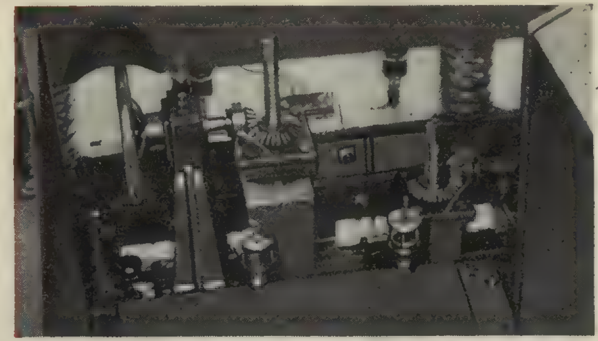
WESTINGHOUSE ELECTRIC

T 31348

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

Dragging out corrugation

Reciprocating Grinder Car, showing one of the grinding units.



Interior view of a Reciprocating Grinder Unit installed in car.

Interior view of Reciprocating Grinder Car.

or dragging out the job?

YOU can drag out the process of removing corrugations but you can't drag out the corrugations—you have to grind them out. In other words, rigging up an old car to drag abrasive blocks over the track reduces corrugation but it does NOT and can NOT remove them altogether without costing altogether too much if you really figure the actual cost.

Corrugations, like malignant physical growths, have to be eradicated completely, otherwise the remedial effort is just so much lost motion.

Drag cars help but cannot cure. For complete cure, you need a reciprocating grinder action.

For bad cases, the surest cure yet discovered is to equip a car with Reciprocating Grinder units such as we have supplied to a number of important lines.

On a basis of actual cost per mile of corrugations actually eradicated, we can show you extremely worth-while economies over any other method yet devised.

Details of the equipment we offer for installation in any car supplied by you and reports of results achieved by roads using this equipment are available. An opportunity to lay the facts before you will be welcomed.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS

Chester F. Gailor, 50 Church St., New York
Chas. N. Wood Co., Boston
H. F. McDermott, 208 S. LaSalle St., Chicago
F. F. Bodler, San Francisco, Cal.
H. E. Burns Co., Pittsburgh, Pa.
Equipment & Engineering Co., London

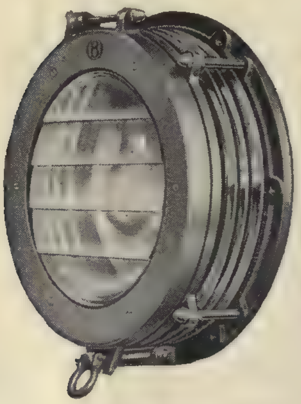
3513

O-B Dash-Illuminating Headlight installed on new electric trolley bus of Chicago Surface Lines.

More
Acorns which
Big

Again you are reminded that it is the little sav-ings which, when taken in the aggregate, make the substantial savings possible in operating expense. Quicker installations, savings in

The Improved O-B Dash-Illuminating Headlight



The *improved* O-B Dash-Illuminating Headlight is a recess mounted headlight for city service with an auto-type door lens and a prismatic side lens, which refracts and directs the light back against the car dash. Made of cast aluminum; weighs only 10 lbs.; supplied with an 8¾-inch Crystal ray or Gold ray glass reflector or chromium plated metal reflector. Can be furnished in cast iron if desired. Fits into 10-inch hole in dash and projects only 3¾ inches. Page 71 of New Products Supplement No. 3 to O-B Catalog No. 20.

FOURTEEN months ago O-B introduced the first dasn illuminating headlight, a radical departure in design and construction from anything previously offered the electric railway industry—a design in keeping with modern street car requirements.

Eight out of every ten of the new cars purchased for city service during 1929 were equipped with this new O-B Dash-Illuminating Headlight. It found an immediate market, and because it is sound in principle and effective in operation it is the new standard for headlights.

Now, by reason of the O-B policy of continuously studying and improving its products, a new and important feature has been added to the O-B Dash-Illuminating Headlight. This improvement is a prismatic side lens, which has the double advantage of not only increasing the side illumination but *actually directs the rays of the light back against the dash of the car,* greatly increasing the volume of light thrown on the dash.

It is not difficult to manufacture a simple prismatic side lens. But it is a distinct accomplishment to produce a prismatic lens in which the refraction of light has been properly directed. The prismatic lens offered in the improved O-B Dash-Illuminating Headlight is the result of a year of intensive study by lighting engineers, a study which created and discarded many designs before the present most efficient design was evolved.

If you have been impressed with the possibilities of the O-B Dash-Illuminating Headlight as it has been used during the past year, you will be doubly impressed by this new development, this new and improved Dash Illuminating Headlight. Its performance on all types of cars, either with flat or curved dash makes it the outstanding choice for all cars, both new or old.

1255CL

Little will grow into Oaks

materials, reduced maintenance, an increased factor of safety and longer life—these are some of the little savings possible, which like little acorns, will grow until they are like the big oaks.

O-B Feeder Dead End Clamp installed to make jumper connections on a mid-western property.

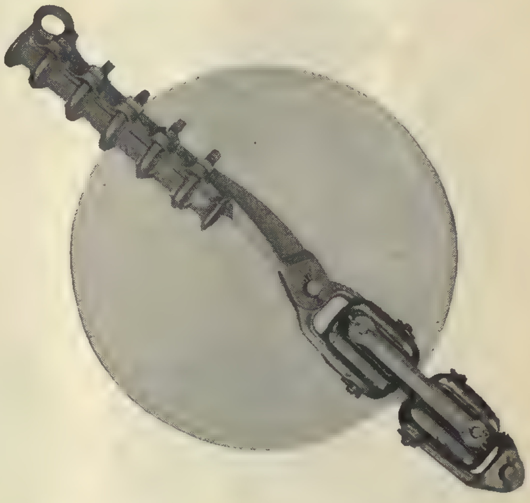
The Money-Saving O-B Feeder Dead End Clamp

ACTUALLY this fine-appearing clamp for use in dead-ending on feeder wire systems offers an immediate definite saving in material up to $7.00 for each dead-end—and in addition provides low installation labor cost and outstanding reliability. Soldering, serving and taping cables at dead ends is eliminated and a 3 or 4-ft. length of cable is saved on each make up.

The O-B Dead End Clamp permits feeders to be cut off and dead-ended in the clamp, or carried through for jumper connection to another feeder either below or on either side, or above the clamp.

The Strain Clamp differs from the Dead End Clamp only in having the clevis end of the clamp inverted, permitting the feeder to be carried straight through, for strain or semi-strain position, or for turning corners on two or more poles without cutting or dead-ending the feeder.

Alert overhead superintendents have called the Feeder Dead-End Clamp and Strain Clamp the best devices to bear the O-B trade mark, and once it is tried out on a property it becomes standard equipment. For more information on this O-B money saving device, as well as other materials of similar economy, consult your O-B representative, or write the Ohio Brass Company, Mansfield, Ohio. In Canada, Canadian Ohio Brass Co. Limited, Niagara Falls, Canada.



O-B low voltage Feeder Dead-End Assemblies are made in three sizes, for 4-0 to 350,000 C. M.; 500,000 to 700,000 C. M. and 750,000 to 1,000,000 C. M. insulated feeder cables. Clamp and fittings of O-B Flecto iron, with galvanized steel U-bolts. Fitted with O-B wet-ware porcelain XH Strain Insulators. Also made with strain clamp for turning corners without cutting, or wherever the feeder requires semi-tension even though it is carried straight through. Pages 6 and 7 of New Products Supplement No. 3 to O-B Catalog No. 20.

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

Illustrating illumination produced on dash of car by using Golden Glow flood-headlights.

FOR MODERN TRAFFIC CONDITIONS

GOLDEN GLOW FLOOD—HEADLIGHT

Heavier traffic at night puts greater safety demands on electric railways. More LIGHT on the dash is the answer!

The Golden Glow Flood-Headlight was designed to fulfill this need by providing a well diffused beam for illumination of the track ahead and at the same time floodlighting the dash of the car. The illumination of the dash is sufficient to make easy the reading of advertising posters at night.

This headlight is ordinarily supplied to accommodate one lamp but is also supplied with two extra sockets where greater intensity of illumination on the dash is desired.

If you have not already received complete information on this safety Headlight we'll be glad to send it to you now. Write.

At left is front view of type FH-916 Flood-Headlight which is equipped with a 9 inch diameter crystal prismatic glass reflector, in combination with a refracting lens.

To the right, is side view of type FH-916 Flood-Headlight showing circular side lens.

ELECTRIC SERVICE SUPPLIES CO. Manufacturer

RAILWAY, POWER AND INDUSTRIAL
ELECTRICAL MATERIAL

Home office and plant at 17th and Cambria Sts., PHILADELPHIA; District office at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver, Winnipeg.

ATLANTA'S RECORD

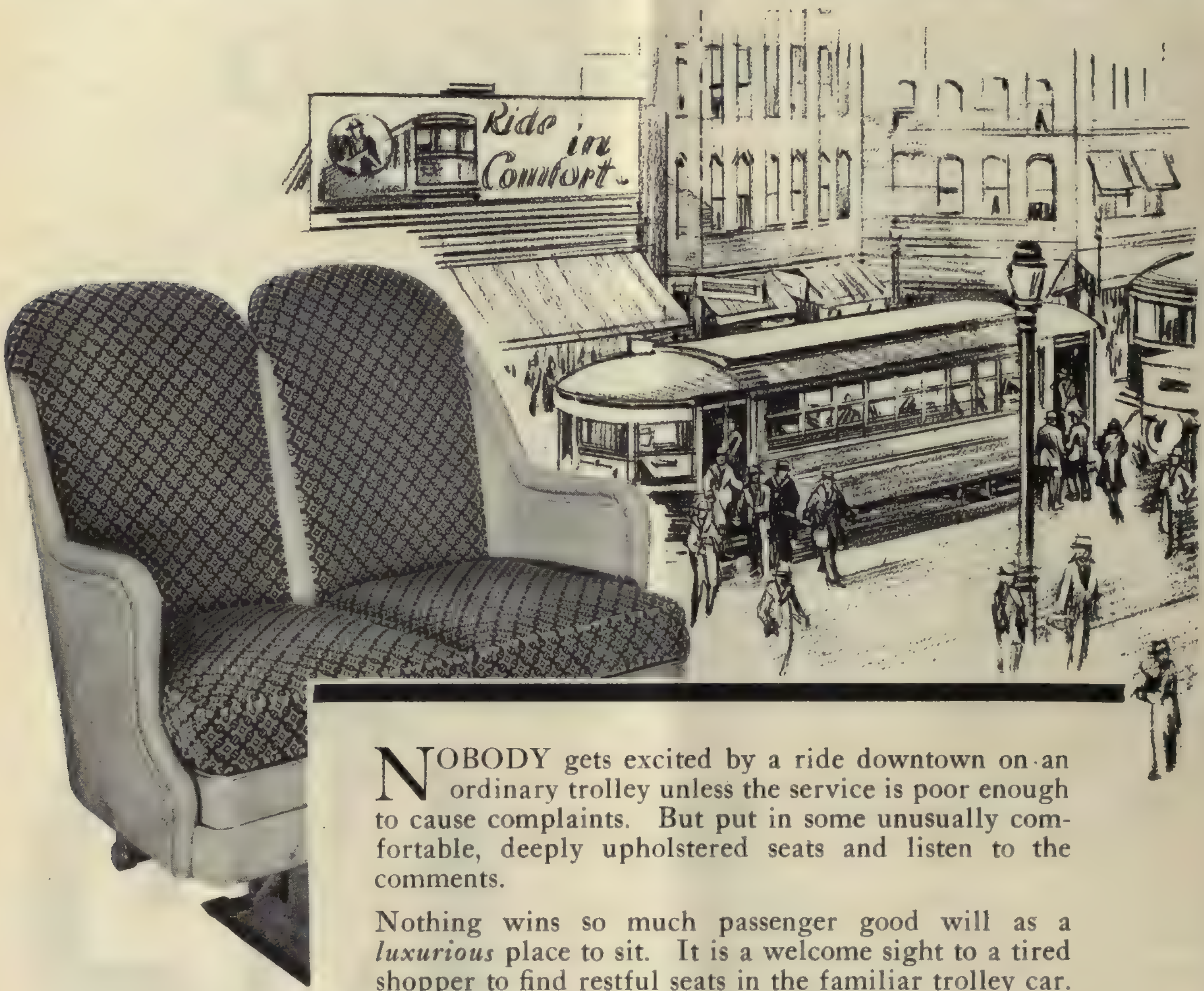
According to the April issue of A. E. R. A., 83,861 miles per pull-in is Atlanta's record for 1929.

National Pneumatic Automatic Treadle Exit Doors are used on 200 of the cars that made this record.

The National Pneumatic Company is proud of their dependable equipment which helped maintain Atlanta's high standard of efficiency.

NATIONAL PNEUMATIC CO.

Such luxurious comfort attracts attention



NOBODY gets excited by a ride downtown on an ordinary trolley unless the service is poor enough to cause complaints. But put in some unusually comfortable, deeply upholstered seats and listen to the comments.

Nothing wins so much passenger good will as a *luxurious* place to sit. It is a welcome sight to a tired shopper to find restful seats in the familiar trolley car.

That is why HALE & KILBURN No. 900 double rotating seats have been designed to provide a riding comfort far beyond anything ever before attempted in railroad seat design. They are luxuriously comfortable and passengers instantly recognize the fact.

Your railroad can immediately attract favorable attention and increased patronage by installing these HALE & KILBURN double rotating seats in its coach equipment.

HALE & KILBURN SEATS

HALE & KILBURN CO.

General Offices and Works: 1800 Lehigh Ave., Philadelphia

SALES OFFICES

Hale & Kilburn Co., Graybar Bldg., New York.
Hale & Kilburn Co., McCormick Bldg., Chicago.
E. A. Thornwell, Candler Bldg., Atlanta.
Frank F. Bodler, 903 Monadnock Bldg., San Francisco.
W. L. Jefferies, Jr., Mutual Bldg., Richmond.
W. D. Jenkins, Praetorian Bldg., Dallas, Texas.
H. M. Euler, 146 N. Sixth St., Portland, Oregon.

SPEED UP YOUR BRAKES *with* RELAY VALVES

This Relay Valve, interposed between the brake valve and brake cylinder, functions to open a direct communication from the reservoir to the cylinder, and from the cylinder to atmosphere. The rapid build-up of pressure thus effected helps to shorten the stop, while quick exhaust of air reduces standing time of a car by permitting a quicker get-away. The fast application—of one second or less—is due to the large capacity of the Relay Valve, its close location to the brake cylinder, and to the small volume between it and the brake valve—reduced to a minimum by the use of copper tubing.

Speedy brake action is needed to meet present-day demands of street railway service—quick stops must be made if cars are to keep pace with other vehicles in the traffic stream. Faster build up of brake cylinder pressure will help to shorten stopping distance, and every second saved in this direction is of value . . . The most effective means yet devised for speeding up brake action is a Relay Valve, the object of which is to reduce the volume of air that is directly controlled by the brake valve during application and release operations.

WESTINGHOUSE
TRACTION BRAKE CO.
General Office and Works, WILMERDING, PA.

The practice of using heavy viscous oils for electric railway car journal lubrication is being revolutionized. ● Today, after years of research and study, The Texas Company is providing the Electric Railway Industry with an entirely new system of car journal lubrication: Texaco Lovis Oils and Texaco Oil Seals. ● This new system of car journal lubrication is now in use on many electric railway properties; and the effect is notable:

1. The cost of lubrication has been lowered. ● 2. Power savings of considerable proportions are being attained. ● 3. Hot box trouble and excessive waste consumption have been ended. ● 4. Marked reduction in maintenance costs is being effected. ● Ask The Texas Company to send a lubrication engineer who will lay the facts before you. You will be interested in the results that are being accomplished—and the savings which you can enjoy through the use of The Texaco System of Electric car journal lubrication.

TEXACO LUBRICANTS

THE TEXAS COMPANY
135 East 42nd Street, New York City

GENERAL ELECTRIC QUALITY

goes into every item of

G-E POLE LINE HARDWARE

and construction specialties

for

RAILWAY SERVICE

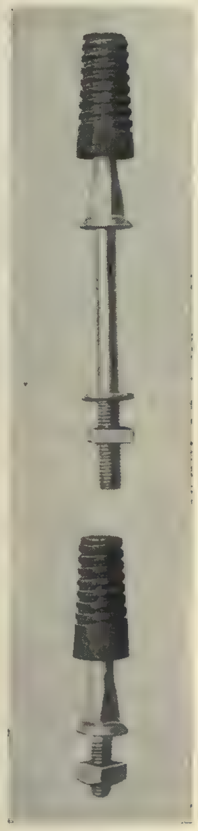
What is General Electric quality? Consider these G-E wood cob pins—

They're made to meet Western Union specifications—furnished with square nuts and clipped washers. The cobs are built to last—manufactured from highest grade dried oak, which is *boiled* in paraffin—thus giving these pins maximum weatherproof protection against snow, sleet and the wear of time . . .

And, of course, all metal parts are hot-dipped, double galvanized for longer life.

That's General Electric quality.

You get it in the whole G-E Line—braces, pole steps, bolts, washers, Western Union type pins, all the Pole Line Hardware needed for railway construction.



Write for the new catalog.

Section xxx, Merchandise Dept.
General Electric Co., Bridgeport, Conn.

Please send me the new Pole Line Hardware and Construction Specialties Catalog.

Name..

Address...

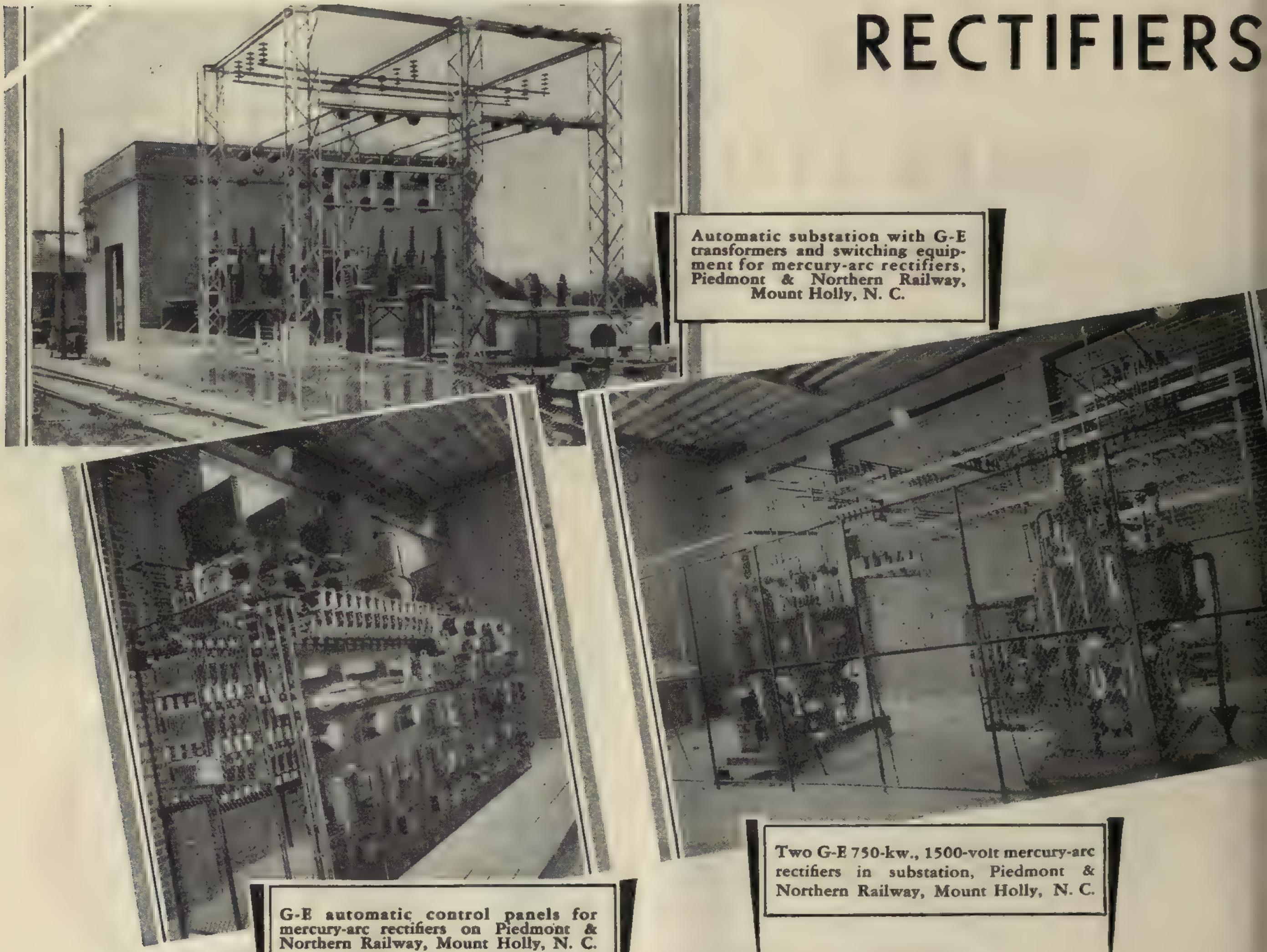
GENERAL ELECTRIC

POLE LINE HARDWARE

MERCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONNECTICUT

PROVED EQUIPMENT

RECTIFIERS



Automatic substation with G-E transformers and switching equipment for mercury-arc rectifiers, Piedmont & Northern Railway, Mount Holly, N. C.

G-E automatic control panels for mercury-arc rectifiers on Piedmont & Northern Railway, Mount Holly, N. C.

Two G-E 750-kw., 1500-volt mercury-arc rectifiers in substation, Piedmont & Northern Railway, Mount Holly, N. C.

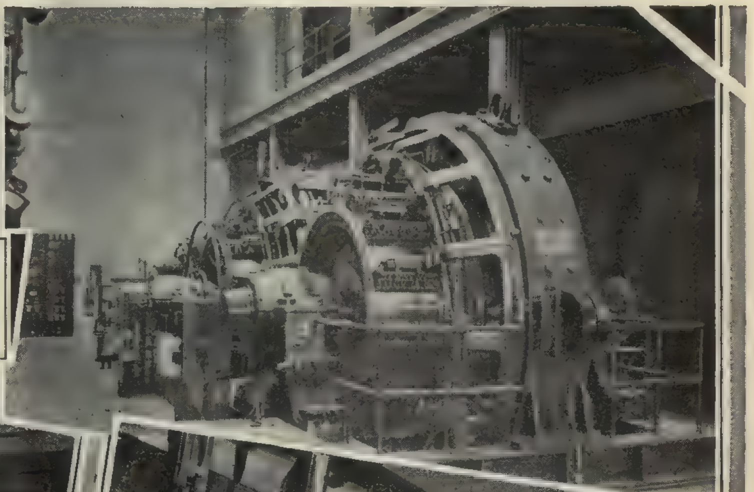
You are invited to take advantage of General Electric's long and comprehensive experience in the manufacture of substation equipment. Rectifiers and converters with suitable control units are available for manual, semi-automatic, and full-automatic operation. Perhaps most important of all—G-E apparatus has proved its dependability through years of railway service. To obtain an analysis of the economies that can be effected with G-E equipment, address the General Electric office nearest you or General Electric Company, Schenectady, New York.

GENERAL

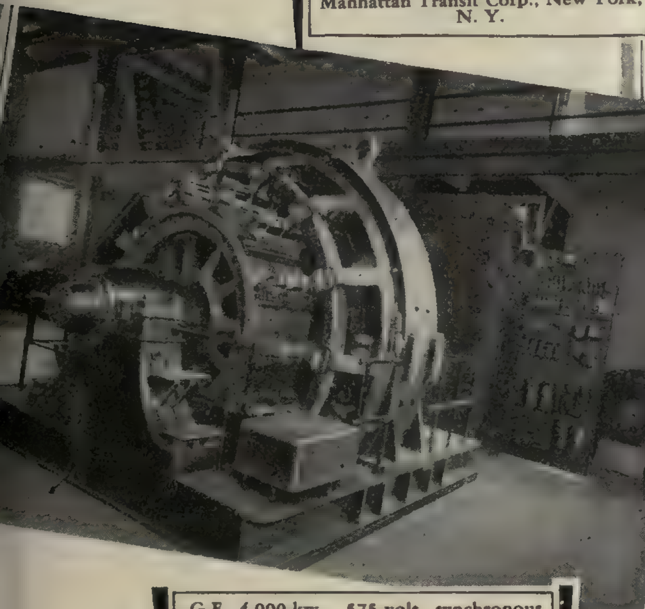
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

for SUBSTATIONS

CONVERTERS



G-E 575-volt synchronous converter of 4,000-, 3,000-, and 2,000-kw., respectively, with manual control, Ridgewood substation. Brooklyn-Manhattan Transit Corp., New York, N. Y.



G-E 4,000-kw., 575-volt synchronous converter with transformer and control equipment, Bushwick substation, Brooklyn-Manhattan Transit Corp., New York, N. Y.

G-E automatic reclosing feeder panels with 3000-amp. air circuit breakers, Coney Island substation, Brooklyn-Manhattan Transit Corp., New York, N. Y.

The illustrations show representative General Electric equipments. The G-E rectifier equipment on the Piedmont & Northern Railway is fully automatic. (This is one of two identical installations on this road.) The G-E synchronous-converter equipments on the Brooklyn-Manhattan Transit Corp. lines include both manual and automatic control. The unit at the Bushwick substation may be started and stopped as required by the operator at the Ridgewood substation. G-E supervisory control gives indication as to its operation, loading, etc. Note also the G-E automatic reclosing feeders at the Coney Island substation.

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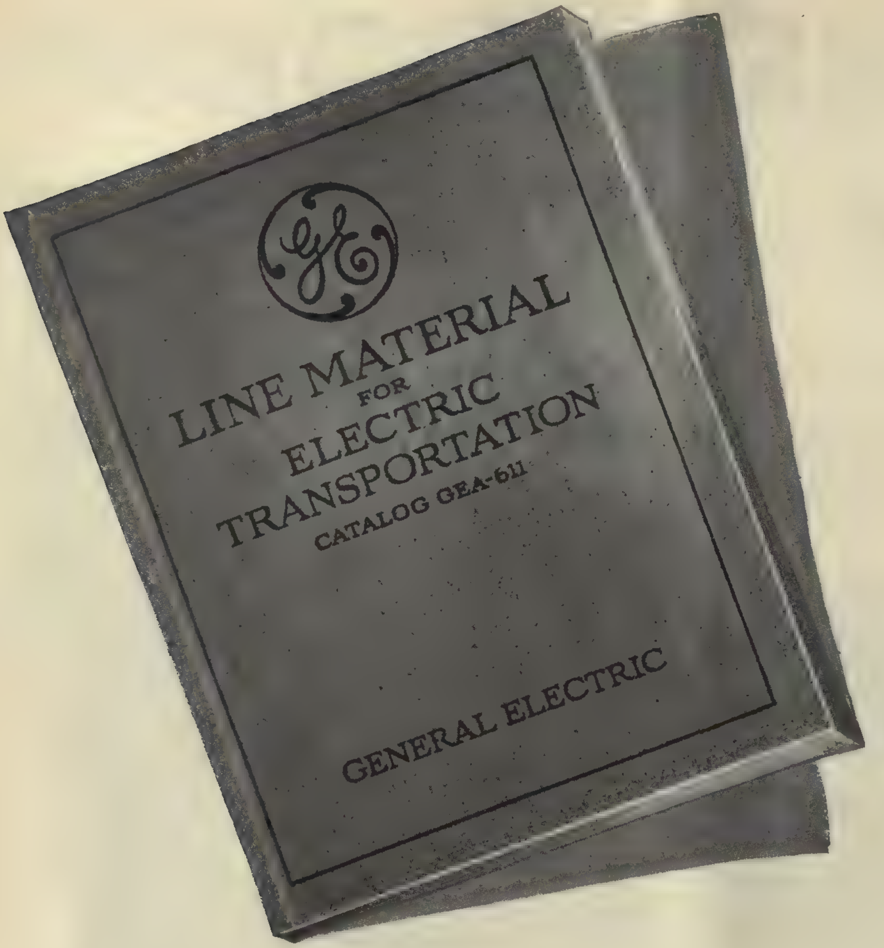
ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES



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SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

John A. Miller, Jr., *Managing Editor*

Volume 74 New York, June, 1930 *Number 6*

Annual Figures Encouraging

INDIVIDUALLY and collectively, the electric railways did well last year. In fact, 1929 was one of the most successful years in the history of the industry. This is shown not only by the annual reports abstracted in this issue and in the April number, but also by the combined statistics of the industry collected by the American Electric Railway Association, and summarized in this issue. Revenues were greater than in the previous year, and expenses were reduced appreciably. As a result, the gross and net income showed a material increase. The number of passengers carried on the rail lines and their subsidiary buses was about sixteen billions, or practically what it has been for the past several years, and fares averaged a little more.

Certainly no industry is dead or dying that is taking in an annual revenue of practically a billion dollars year after year, with only minor fluctuations. It should be obvious that a service such as this, paid for a few cents at a time day after day and by millions of people, must be an essential part of the national life. It is a service that cannot be withdrawn without leaving a gap that would be almost impossible to fill. In those few instances where transportation service has been withdrawn temporarily, the loss to the community has been so great that business and even social activities have been virtually at a standstill.

Not all sections of the country contribute equally to the demand for the service community transportation has to offer. Naturally the larger cities are most dependent on public transportation. Conversely, the rural districts need it the least. Last year the city systems made the best showing and the interurbans the poorest, but some of the interurbans which have developed an attractive freight service were able to make a profit.

With a record such as last year's behind it, the place of the electric railway in transportation seems assured for many years. As the country develops and congestion becomes greater, the need for public transportation is certain to increase. By aggressive leadership the present transportation lines surely can maintain the pace.

Educational Activities Lag

A STALEMATE apparently has been reached in the educational activities of the electric railway industry. For twenty years the A.E.R.A. committee on employee relations, or its predecessor, the committee on education, has urged the training of street railway personnel, particularly the platform men. More recently it has sponsored conference training groups at the annual convention of the association. The unanimous opinion of those who have attended these sessions has been that they are productive of much good. The entire program of the educational committee has been strongly supported by the executive committee, and its activities and recommendations have been approved. Despite this and other endorsements, the members of the committee were obliged to admit, at a recent meeting, that only a small number of railway executives had actually inaugurated educational programs on their own roads.

The great majority of managers, while personally rendering lip service to the work of the committee, has remained strangely apathetic about putting educational programs into effect. There seems to be an inertia in the industry which no amount of effort on the part of the committee has been able to overcome. It is another example of the truth of the old adage that you can lead a horse to water, but you cannot make him drink.

If an educational program were a matter involving any considerable expense, this attitude would be understandable. But it has been conclusively demonstrated that a modest but effective effort along the lines of employee training is not necessarily an expensive matter. Excellent results have been obtained on certain properties with little outlay other than the time of the executive or some of his assistants. An aggressive superintendent, intent upon getting the most out of his train force, can inaugurate and carry through a thoroughly successful conference training course at almost no cost.

Recently a prominent retail merchant made the statement that the organizations which will have the greatest success during the coming year will be those which have given the most attention to personnel training. This certainly applies with equal force to companies engaged in rendering local transportation service. It is never too late to begin. But the committee cannot do the work alone. It can only supply the ideas. The job of the individual companies is to put them into practice.

Compulsion or Persuasion

THAT pedestrian movement at street intersections is a factor of primary importance in traffic regulation, is generally recognized. Helter-skelter crossing of pedestrians in all directions at all times greatly retards the movement of wheel vehicles and adds materially to street traffic congestion. How to secure orderly pedestrian movement is the problem. Usually it has been attempted by the simple means of compulsion. Pedestrians have been ordered to obey the traffic lights under threat of more or less severe penalities if they disregard them. This method has worked fairly well when a sufficient number of policemen have been employed to compel observance of the rules. With policemen absent, however, the rules are generally more honored in the breach than in the observance. As it is practically impossible to provide sufficient policemen to watch all intersections, this method of control has achieved no marked success.

Undismayed by the failure of compulsory pedestrian control in many other cities, Police Commissioner Whalen has just undertaken an attempt to enforce it in New York. His optimism compels admiration if his good judgment does not. Probably nowhere else in the United States are conditions less favorable than in New York for this type of pedestrian control. At a great many street intersections there is an enormous volume of pedestrian traffic. Old fashioned synchronized signal lights are operated on an extremely long cycle, generally two minutes for north and south movement and one minute for east and west movement. It is hardly likely that pedestrians will willingly wait two minutes for a green light before attempting to cross the street. Moreover, the fact that both right-hand and left-hand turns are permitted at nearly all intersections makes it almost as dangerous for a pedestrian to cross on a green light as on a red light. Altogether, it is safe to prophesy that the new rules will be observed only when the representatives of the law are on hand to enforce their observance.

In marked contrast to this unpromising enterprise is the method of pedestrian regulation adopted in Pittsburgh. There no attempt is made to compel adherence to the signal lights, but the intervals are so arranged as to encourage the pedestrians to thus utilize the green period. The total length of cycle is about 50 seconds divided into green and red periods according to the needs of the particular intersection. At the end of the green period is a short overlapping yellow clearance period. Thus the pedestrian has only a short wait and is assured of a safe crossing. The best indication of the merit of this plan is the fact that a large majority of pedestrians voluntarily follow the signal indications.

The Exception May Prove the Rule

SEVERAL important issues are involved in the recent rejection by the Indiana Public Service Commission of the proposed merger of various railway, light and power and other public utility properties, including the Terre Haute, Indianapolis & Eastern Traction Company and its subsidiaries. In its contention that each branch of the service should be self-supporting, the commission took a position in accordance with precedent and generally accepted opinion. From the evidence presented, the commission reached the conclusion that the electric railways would be unable to carry their share of the obligations of the merged properties and that an undue burden would thereby be placed upon the users of the other services. In reaching this conclusion, the commission was prejudging the case for railway operation under the new management, but was no doubt within its rights in so doing.

There were certain factors in this particular situation, however, to which it appears the commission might reasonably have given more weight than it did. In the past the Insull interests have shown a skill which amounts almost to wizardry in the restoration of electric railways which were generally regarded as hopeless. The rehabilitation of the Chicago, South Shore & South Bend Railroad is an outstanding example. While they did not guarantee that it would be possible to continue all of the interurbans included in the proposed merger, they did pledge themselves not to abandon lines until after "a fight backed by capital and a knowledge of transportation has been made to save them." To do this would doubtless have necessitated that earnings be plowed back into the properties for a time. Technically this would perhaps have run counter to the idea that each branch of the service should be self-supporting, but it might have saved transportation lines of immense value to the territories served. Much was at stake. Protection of the public is one of the primary functions of a regulatory commission, and if it believes that a merger is not in the public interest it can follow no other course than to refuse its permission. In this instance, however, good reason existed to hope that a successful solution of the transportation problem could be worked out. Under the circumstances, the onus will be largely on the commission for any curtailment of service and loss to investors through such further disintegration of the railway property as may well follow the state's negative decision.

Too Many Self-appointed Experts

WHEN we have a difficult financial question to answer we consult a banker. When we have a knotty legal problem to solve we consult a lawyer. Many people have frequent dealings with banks, but they do not profess to a technical knowledge of banking. Nor do they assume to be lawyers simply because they have sat in a courtroom. But when it comes to a question of transportation, rare in deed is the man who does not feel himself fully qualified to offer a solution of the most difficult problem.

Usually, when a city is faced with a difficult transportation problem, there exists a strange reluctance to consult an experienced transportation man to find a solution. Apparently the suggestions offered by the butcher, the baker and the candlestick maker are considered to be just as good as any technical advice. The idea seems to prevail that because a man uses the service or because he is dependent on it to bring customers to his store, he is fully qualified to pass judgment on any and all matters pertaining to public transportation.

The opinions of business men, of course, are not without value in studying the transportation problem. Just because a man is a good business executive, however, he is not necessarily qualified to offer practical advice on transportation matters. Usually, the self-appointed expert fails to realize that there are many sides to the problem, some of which are by no means evident at first glance. The side which seems most important to him may be least important to some one else whose situation and needs are entirely different from his. Agreement on what should be done is reached only if the butcher, the baker and the candlestick maker all have some interest in common. Such agreement, however, scarcely ever takes into consideration the views of other elements of the community. The logical procedure is to select a transportation man to solve a transportation problem. The proper solution of this problem is too important to the welfare of the entire community to be left in the hands of any business men's group or committee whose good intentions are exceeded only by their lack of experience.

Efficient Maintenance as a Revenue Producer

MAINTENANCE properly applied will surely yield a high return on the expenditure made. To accomplish this, however, it must be carried beyond the strictly mechanical aspect. The public must be conscious of the progressive effort to improve equipment and service for its comfort and convenience. The railway supervisor or shop foreman, as he rides the line, listens for the perfect purr of the car motors or bus engine, feels the effects of good brake adjustment and notices wheel alignment as a bus approaches him. The stenographer, the merchant and the shopper, however, take these things for granted. They notice the door that does not completely close, the buzzer buttons that do not operate, the grease left on a seat or hand strap, and the window that will not open.

Maintenance practices cannot be confined to periodic inspections, or to minor repairs and replacements for the purpose of getting the most work out of a car or bus. These are important and tend to overcome any loss in the economic value of a vehicle, but unless maintenance is definitely progressive in its encouragement of the riding habit, the vast amounts of money spent for this phase of operation are unproductive. To be progressive, maintenance must be constructive, must effect improvements in comfort, speed and convenience as well as in mechanical operation, and must result in equipment capable of competing in all respects with new vehicles of the latest standards.

Effective maintenance, from the standpoints of both the engineer and the public, depends fundamentally in making practical and thorough application of good maintenance theory. Undoubtedly every company includes in its program those details of inspection and repair that directly affect the economic phases of operation, as well as the refinements which the rider has come to demand, but the man on the job does not always realize the fact that the routine work for which he is responsible has a decided influence upon patronage. When he does, his efforts will result in a closer co-operation with the operating department, and many costly abuses of maintenance economies will be eliminated. The shop foreman, the mechanic and the car cleaner are producers of revenue.

Piling Up Bricks and Trouble

HIGHER, ever higher, rise the soaring skyscrapers in our large cities as ambitious building owners struggle to overtop their rivals. The marvel of yesterday is dwarfed by the new wonder of today, and this in turn is immediately surpassed by plans for the erection of an even taller edifice tomorrow. As an achievement in building construction this is perhaps very admirable, but as a tendency in civic development it may well occasion serious misgiving.

That high buildings have certain economic advantages cannot be denied. To a considerable extent, however, the owner of such a building secures these advantages at the expense of others. To obtain light and air for the workers in a skyscraper the light and air is cut off for those in adjacent lower buildings. The simplification of interior communication in a large building may result in savings for the tenants, but the consequent concentration of thousands of people in a small area adds enormously to the cost of providing adequate transportation facilities. This cost, however, is not paid directly by the building owner. If it were, it is not unlikely that much of the present enthusiasm for soaring towers would vanish overnight.

Concentration has now been carried to such a point in certain localities that safe and comfortable transportation of people to and from their work has become practically impossible. Transportation of goods, which is the lifeblood of industry, has been brought almost to a standstill by street congestion. Millions of dollars will be needed to build the various subways, elevated highways, bridges and tunnels which have been proposed as means of relieving this situation. Moreover, the degree of relief that they will afford is problematical. In fact, it is becoming increasingly clear that the only real hope of reducing congestion lies in reducing the volume of traffic which flows in and out of the business districts every day. So long as we continue to pile up bricks higher and higher, we are also piling up transportation troubles.

The West Coast Beckons

WITHOUT doubt one of the greatest benefits to be derived from convention attendance is the opportunity which it affords to establish contacts. Papers and reports can be read in the seclusion of the office or home. The spirit of the convention is adequately interpreted in the press. The full benefit of the informal but equally important discussions, however, can be had only by personal attendance. It is through intimate contacts established in the anterooms and hotel lobbies that much of the real business of the convention is accomplished. In this manner many of the policies of the industry are shaped and many of its major policies are settled.

It is not too much to say that the splendid spirit of mutual helpfulness which has characterized the meetings of executives throughout the Eastern section of the country has for years been a cogent force in shaping the destinies of the transportation business. The exchange of suggestions, ideas and advice, inspired by problems of mutual interest and encouraged by a spirit of fellowship developed through close association, has gone far to sustain a confidence in the essential stability of the industry.

An opportunity now presents itself to broaden the scope of these associations by a more general inclusion of executives from the West Coast. New problems, new ways of meeting them, new horizons to explore, await the delegates to the San Francisco meeting in June. An extremely interesting program of papers, luncheons and informal discussions has been arranged by the convention committee. There will also be plenty of time for establishing those personal contacts which have proved to be of such immeasurable value.

Western executives have lent their presence in considerable numbers at the Eastern meetings of the association. Year after year they have crossed the country to attend sessions at Cleveland or Atlantic City. They have given liberally of their time, ideas and experience in attending meetings of the various committees. Now is the time for Eastern executives to reciprocate.

At several important junction points vehicle traffic is excluded from the car tracks to facilitate movement

Berlin Transportatio

By

WALTER BRESLAUER
Ph.D.

Some lines even in the center of the city are on private right-of-way

FAR-REACHING changes have been made in the Berlin transit situation during the last two or three years. For one thing, the Hoch-und-Untergrundbahn (elevated and subway rapid transit railway) has been consolidated with the street car and bus lines to form a unified system. This is the outstanding event in the transportation field in the city. Then, too, the Stadt, Ring & Vorortbahn (city, belt and suburban railway system), which is a branch of the German state railway system, has been electrified to form a modern high-speed local system within the city. It supplements the rapid transit lines to round out the unified service.

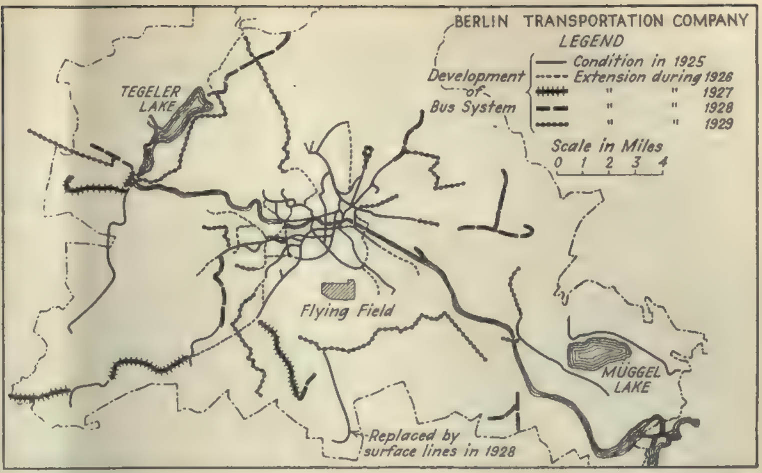
Surface car service was consolidated and taken over by the municipality many years ago, and more recently was assigned for operation to a municipal street railway operating company, while the city retained direct ownership of the plant and rolling stock. The Berlin Omnibus Company, formerly a private corporation, has gradually come under municipal domination as the stock has been acquired by the city, which now owns 90 per cent of all the outstanding shares. The same process of acquiring stock brought the rapid transit company under municipal control.

When it was desired to form a consolidated transportation company the city, owning 75 per cent of the stock of these companies, acquired the remaining assets and obtained full control of the rapid transit and bus companies. Under the plan of organization adopted by the City Council, the new Berlin Transportation Company, with a capital of 400,000,000 marks ($100,000,000) has all the features of a private corporation. There is a board of directors, selected from the City Council and the Board of Aldermen, and a set of corporate officers. Herr Reuter, who visited the United States last year, is chairman of the Board of Directors.

Prior to the formation of the new company, but after the city had obtained a large measure of control, there had been a working agreement among the three companies. The plan then in force was discussed in an article by Henry W. Blake in Electric Railway Journal for Sept. 24, 1927. Zone fares and class fares were eliminated and a flat fare of 20 pfennige (5 cents) with one free transfer was adopted. Due to lack of bus capacity transfers to the buses from the rail lines were not given, but in January, 1928, this privilege was extended. At the same time a limited transfer was given between the local zone district of the Stadtbahn and the city lines.

At the present time, each passenger receives a ticket

Combination of surface lines, rapid transit and buses has eliminated duplication of service. Universal transfer system has proved of great benefit to the public as well as operators. Extensive construction program for rapid transit system planned to provide adequate service for outlying districts. New surface cars designed to speed up schedules



Extensions to the city bus lines have been made each year since the co-ordinated system was established

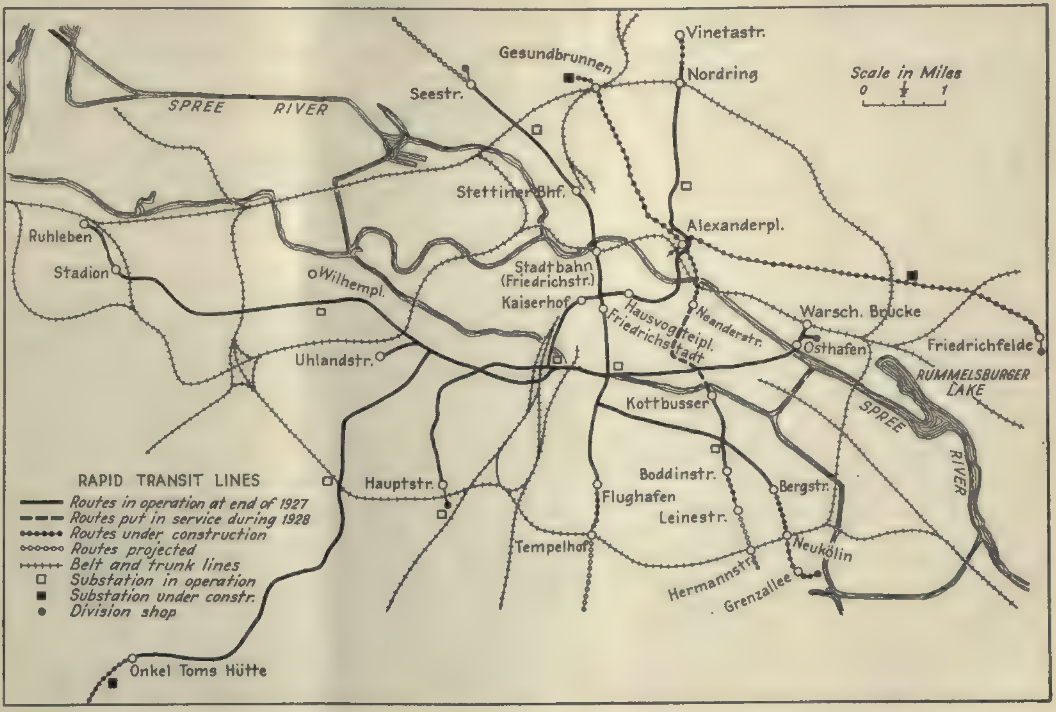
Facilities Co-ordinated

entitling him to one free transfer for similar service on either of the two other systems. Changing trains in prepayment areas is not considered as a transfer. Tickets including a ride on the Stadtbahn system and one on the municipal system are sold for 30 pfennige (7½ cents). The transfer ticket is good for 1½ hours after issue. Monthly card tickets good on one or more surface lines or on the rapid transit system are issued at various rates. At the present time 25 per cent of the rides on the Berlin system are with monthly tickets.

Extension of the fare privileges increased the use of the system a great deal. In 1926 the riding habit was about 266 rides per capita. In 1927 it had increased to 291 and in 1928 to 325.

In order to improve the financial situation fares were raised on Jan. 1, 1929, to 25 pfennige (6 cents), with corresponding increases in the ticket rates. The Stadtbahn made a similar increase in order to reduce its deficit. Despite these advances in fares traffic continued to grow, as may be seen from Table I. A great part of the expansion has been on the bus system. More buses have been added, particularly in the suburban districts. On the other hand, the flat fare has likewise increased the riding on the rapid transit lines, as many passengers now use other means of transportation for a portion of the trip.

The growth of traffic on the rapid transit lines has been so great that it has been necessary to improve the



The rapid transit system in Berlin has been expanded greatly and now serves all parts of the city

Steel side-entrance cars are used on some of the Berlin rapid transit lines

service a great deal. Trains have been increased from six to eight cars. To do this it was necessary to lengthen a number of the station platforms. Schedules have also been speeded up. It is noteworthy that an increase in traffic of 50 per cent on the rapid transit lines was handled with a 10 per cent increase in staff. The longer trains, faster schedules, and the adoption of labor-saving devices, particularly in the fare collecting system, made this possible. There has been an increase in the maximum wage of 25 per cent during the same period, so that part of the gain has been absorbed in that manner.

Consolidation of the services has made it possible to eliminate costly duplication of car mileage and competitive methods. The universal transfer system has increased the riding, however, without a corresponding increase in revenue. Originally the bus lines, which belonged to a competing company, in many instances ran parallel to street car lines. After the consolidation new bus lines were installed only in the suburbs and as crosstown lines. No general rearrangement of the routes has been attempted as yet, although it is felt that some general plan will have to be worked out which will get the most out of the service and at the same time be popular with the riders.

Table I—Passengers Carried by Berlin Municipal Transit System, 1927-29

	1929	1928	1927
Street cars	929,000,000	672,800,000	714,100,000
Rapid transit lines	277,200,000	125,800,000	132,600,000
Buses	277,100,000	120,800,000	122,500,000
Stadtbahn system	444,300,000	415,100,000	....
Total	1,927,600,000	1,334,500,000	....

Table II—Service Operated by Berlin Transportation Agencies, 1926-28

	Car Miles		
	1928	1927	1926
Street cars	105,000,000	99,000,000	98,000,000
Buses	23,000,000	18,000,000	14,000,000
Rapid transit lines	33,000,000	27,000,000	23,000,000

For the year 1928, operating expenses per surface car-mile were 18.5 cents, per rapid transit car-mile 20 cents, and per bus-mile 31 cents. Although there seems to be a preference for buses on the part of the riding public, it is easy to see that the management does not favor wholesale expansion of the bus system under existing conditions. New six-wheel buses with pneumatic tires, seating 75 passengers, have been exceedingly popular, although the speed does not exceed that of the surface cars.

It is apparent that the surface cars are the backbone of the Berlin transportation system, and will remain so for a long time to come. Yielding the largest surplus, this service will be improved steadily and extended into the suburbs as fast as the traffic warrants. The installation of heavier motor equipment has made it possible to speed up the schedules, and construction of tracks on private right-of-way in the middle of many boulevards has eliminated interference from vehicular traffic. Unfortunately, the narrow streets and sharp curves offer a severe handicap to the introduction of longer, large capacity American-type cars, particularly in the downtown district. However, 300 new cars with multiple-unit control have recently been placed in service, and it is expected

One of the latest single-truck surface cars used in Berlin that eventually the use of small single-truck trailers will be discontinued.

It is the intention of the city and the transportation company to proceed as soon as possible to the construction of new subway lines. With a traffic increase of 1,000 per cent and a steady growth in number of buses and surface cars, congestion on important thoroughfares in the downtown district has reached a point where the diversion of mass transportation into subways appears imperative. Berlin's population in 1926 was approximately 4,000,000. It is growing at the rate of 80,000 per year, and the city limits have been extended greatly since the end of the war. There still is a considerable shortage in dwellings, and a development of outlying residential districts is under way. Adequate transportation facilities to these new suburban districts is one of the main problems of the management.

A plan for an enlarged rapid transit system to be built within fifteen to twenty years at an estimated cost of about one billion marks has been prepared and placed before the municipal authorities. This would give relief to the overtaxed lines in the central district and provide for extensions of existing lines to points where connections with the surface systems can be made for distribution in the residential sections. In view of the present financial situation in the city, no action has been taken, and it is doubtful just when the work will be authorized.

Articulated trains are run into the suburbs on the rapid transit lines of the Berlin system

The plan takes into consideration the value of the electrified Stadtbahn, which is now furnishing a large amount of rapid transit service. While co-ordination has been effected, as mentioned, consolidation with the city system is still far off.

The rapid transit plan proposed would be carried out in three parts, as follows:

1. Completion during 1930 of subway construction under way, consisting principally of a second north-south line, with a branch serving the densely populated district east of Alexanderplatz (13.6 miles of double track).

Table III—Number of Vehicles Owned by Berlin System, 1926-29

	1929	1928	1927	1926
Surface motor cars	2,159	1,859	1,880	....
Surface trailer cars	....	1,789	1,761	....
Buses	788	620	561	450
Rapid transit cars	1,233	997	828	793

Table IV—Length of Routes and Track, Berlin Municipal Lines

	1929	1925
All bus lines operated, miles	210	113
All street car lines, miles	1,025	885
Street car lines, miles double track	405	360

Table V—Revenues and Expenses per Passenger in Cents

	1928	1927	1926
Average receipts per passenger	3.4	3.7	4.2
Expenses per passenger, including taxes	2.8	3.5	3.0

Table VI—Number of Employees of Berlin System

	Dec. 31, 1928	Dec. 31, 1926
Street cars	14,406	13,735
Buses	4,546	2,840
Rapid transit	7,020	6,050
Total	25,972	22, 25

2. Construction of two new lines, one northeast-southwest, and one extending the eastern line to a point farther southwest, intersecting each other at Potsdammer Platz and with the existing rapid transit trunk line and also the proposed north-south subway connection of the Stadtbahn (10.5 miles).

3. Construction of additional subways to make the system more comprehensive and reaching all important sections of the city (41.5 miles).

There is some question as to the desirability of continuing the flat fare with universal transfers. The situation in Berlin differs materially from those existing in American cities. Most of the passengers on all three transit systems are long haul riders. Even including the universal transfers the average length of ride on the street cars is 2.6 miles, on the buses 2.9 miles and on the rapid transit lines 3.5 miles. These figures, it is held, justify the same rate of fare on each of the systems. The principal reason advanced for continuance of the flat fare system is that public funds are used to develop outlying residential areas, and it is desired to stimulate them through low-priced transportation. Similar considerations account for the method of financing for new subways. Under the present housing regulations, with rentals fixed and taxed by the government, and under precarious economic conditions which restrict real estate values, the cost of subway construction cannot be assessed against the benefited property. Only in one stance, that of the Dahlem-Zehlendorf extension, can a large increase in the land values be anticipated. In consequence the owners, the Prussian state and a private concern which is developing this district as a new residential area, will have to pay the greater part of the cost of this open-cut line.

Many More Railway Reports Show Gains in 1929

EARNINGS reports from 45 properties for the year 1929, as compared with 1928, are presented herewith. These supplement the reports from 65 companies published in this paper for April, 1930, page 204. Taken together, they present the financial record of the year for a large portion of the industry.

Only reports of railway or bus operating companies are included. In a few instances, where the railway figures of a combined property are given separately, they have been shown. It has been the aim to exclude auxiliary operations such as light and power or gas manufacture. Since a number of important railway systems which are part of larger utility properties do not publish separate reports, it has not been possible to give the financial results. A considerable number of the annual statements do not separate taxes from operating expenses. Whenever the information could be obtained, these items are shown separately in the tables.

In general, the trends shown in the previous article hold for the additional companies listed herewith. Out of a total of 100 reports for which comparisons between the two years can be made, 48 have shown an increase in operating revenue against 52 on which there have been decreases. Operating expenses have been decreased on 57 properties and increased on the remaining 43. As a result of the combination of these trends, 53 companies showed an increase in operating income last year, as against 47 which suffered a reduction. The improvement in income was by no means confined to large properties, but was fairly well distributed throughout the range.

CONDENSED FINANCIAL REPORTS OF ELECTRIC RAILWAY PROPERTIES, 1929-1928

	Fort Smith Traction Co., Fort Smith, Ark.		**Visalia Electric R.R., Exeter, Cal.**		**Bakersfield & Kern Electric Ry., Fresno, Cal.**		**Fresno Traction Co., Fresno, Cal.**		**Los Angeles Railway, Los Angeles, Cal.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues...	$154,118	$180,310	$192,777	$241,726	$88,816	$92,433	$286,688	$311,897	$14,874,309	$13,175,162
Railway operating expenses...	142,373[1]	158,684[1]	99,832	115,529	96,724	96,418	279,667	300,561	11,222,861	11,002,575
Net revenue, railway oper...	....	....	$92,945	$126,197	*$7,907*	*$3,985*	$7,020	$11,335	$3,651,448	$2,172,587
Taxes........................	....	....	18,192	26,618	6,358	6,728	17,956	19,053	997,391	833,675
Operating income..........	$11,745	$21,626	$74,752	$99,578	*$14,265*	*$10,714*	*$10,935*	*$7,718*	$2,654,056	$1,338,912
Non-operating income........	....	....	6,746	1,385	15	....	7,037	6,296	*159,849*	*180,950*
Gross income..............	....	....	$81,498	$100,963	*$14,250*	*$10,714*	*$17,972*	*$14,014*	$2,494,207	$1,157,962
Deductions from gross income.	....	....	....	....	....	....	....	....	....	....
Net income................	....	....	....	....	....	....	....	....	....	....
Operating ratio..............	....	....	0.511	0.519	1.089	1.043	0.979	0.976	0.755	0.835

	Pacific Electric Ry., Los Angeles, Cal.		**San Francisco, Napa & Calistoga Ry., Napa, Cal.**		**Sacramento Northern Ry., Sacramento, Cal.**		**San Diego Electric Railway, San Diego, Cal.**		**California St. Cable R.R., San Francisco, Cal.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues...	$18,417,335	$18,310,987	$215,888	$215,481	$2,104,366	$1,477,452	$1,624,534	$1,659,768	$494,344	$514,109
Railway operating expenses...	15,499,320	15,876,041	166,562	157,789	2,051,669	1,185,104	1,356,560	1,384,800	432,936	447,230
Net revenue, railway oper...	$2,918,014	$2,434,946	$49,325	$57,691	$52,696	$292,347	$267,973	$274,967	$61,408	$66,879
Taxes........................	1,112,611	1,138,742	11,685	12,098	130,493	90,569	163,686	120,087	34,561	33,431
Operating income..........	$1,805,403	$1,296,204	$37,639	$45,592	*$77,797*	$201,778	$104,287	$154,880	$26,846	$33,447
Non-operating income........	281,931	238,645	*$16,346*	*$13,143*	76,624	51,728	110,967	96,944	12,466	13,553
Gross income..............	$2,087,334	$1,534,849	$21,293	$32,449	*$1,173*	$263,506	$215,254	$251,824	$39,312	$47,000
Deductions from gross income.	....	....	....	....	....	....	....	....	....	....
Net income................	....	....	....	....	....	....	....	....	....	....
Operating ratio..............	0.841	0.867	0.771	0.732	0.975	0.802	0.835	0.834	0.876	0.870

	Central California Traction Co., San Francisco, Cal.		**Northwestern Pacific R.R., San Francisco, Cal.**		**Peninsular Railway, San Jose, Cal.**		**San Jose Railroads, San Jose, Cal.**		**Stockton Electric Railroad, Stockton, Cal.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues...	$390,893	$445,048	$6,186,763	$6,355,971	$228,764	$239,178	$349,061	$359,326	$278,471	$296,72
Railway operating expenses...	441,620	435,103	5,384,886	5,732,204	264,201	313,683	293,199	295,035	227,480	247,03
Net revenue, railway oper...	*$50,727*	$9,945	$801,876	$623,766	*$35,436*	*$74,504*	$55,862	$64,290	$50,991	$49,68
Taxes........................	26,082	17,315	449,433	478,960	11,964	11,825	23,693	24,231	20,340	20,77
Operating income..........	*$76,809*	*$7,369*	$352,442	$144,805	*$47,401*	*$86,329*	$32,169	$40,058	$30,650	$28,91
Non-operating income........	247,186	680	*43,679*	*61,537*	38,564	37,109	1,857	1,912	505	84
Gross income..............	$170,377	*$6,689*	$308,763	$82,268	*$8,837*	*$49,220*	$34,026	$41,970	$31,155	$29,75
Deductions from gross income.	....	....	....	....	....	....	....	....	....	....
Net income................	....	....	....	....	....	....	....	....	....	....
Operating ratio..............	1.129	0.977	0.870	0.902	1.111	1.311	0.840	0.821	0.817	0.83

	Tidewater Southern Ry., Stockton, Cal.		**Chicago, Aurora & Elgin R.R., Aurora, Ill.**		**United Rys. & Electric Co., Baltimore, Md.[18]**		**Boston, Worcester & N. Y. St. Ry., Framingham, Mass.**		**Berkshire Street Railway, Pittsfield, Mass.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues...	$308,853	$349,361	$2,807,829	$2,802,845	$16,718,321	$16,273,825	741,023	721,928	$718,069	$739,21
Railway operating expenses...	279,268	241,133	2,426,219	2,447,259	11,329,137	10,885,708	609,268[5]	594,734[5]	612,420	610,28
Net revenue, railway oper...	$29,585	$108,228	$381,610	$355,586	$5,389,184	$5,388,117	89,702	93,841	$105,649	$128,92
Taxes........................	26,057	30,860	118,097	121,295	1,659,968	1,573,061	18,294	21,116	21,011	30,53
Operating income..........	$3,528	$77,367	$257,298[20]	$227,854[20]	$3,729,215	$3,809,056	71,408	72,725	$83,739	$98,49
Non-operating income........	7,163	2,194	292,712	249,266	198,667	175,041	12,816	2,496	3,010	1,85
Gross income..............	$10,691	$79,561	$550,010	$447,120	$3,927,882	$3,984,097	84,224	75,221	$86,749	$100,35
Deductions from gross income.	....	....	476,098	439,072	3,385,495	3,410,955	55,408	56,752	292,527	296,32
Net income................	....	....	$73,912	$8,048	$542,387	$573,142	18,816	18,469	*$205,778*	*$195,97*
Operating ratio..............	0.904	0.690	0.864	0.873	0.677	0.669	....	....	0.853	0.82

CONDENSED FINANCIAL REPORTS OF ELECTRIC RAILWAY PROPERTIES, 1929-1928 *(Concluded)*

	Springfield Street Ry., Springfield, Mass.		**Worcester Consolidated Street Ry., Worcester, Mass.**		**Kansas City, Clay Co. & St. Joseph Ry., Kansas City, Mo.**		**St. Louis Public Service Co., St. Louis, Mo. (Revised)**		**Omaha & Council Bluffs Street Ry., Omaha, Neb.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues	$2,719,696	$2,789,846	$3,068,691	$3,116,623	$698,527	$701,526	$19,703,101	$19,805,490	$3,896,821	$3,696,846
Railway operating expenses	2,191,364	2,197,844	2,379,423	2,443,856	580,706[1]	558,863[1]	14,898,843	15,027,072	2,507,815	2,370,290
Net revenue, railway oper	$528,332	$592,002	$689,268	$672,767	....	....	$4,804,258	$4,778,418	$1,389,046	$1,326,556
Taxes	37,837	31,330	74,937	72,284	....	....	1,947,780	1,877,808	419,841	377,197
Operating income	$490,495	$560,672	$614,331	$598,483	$117,821	$142,663	$2,856,478	$2,900,610	$969,166	[4]$350,681
Non-operating income	8,892	6,348	24,685	21,831	5,457	9,554	58,902	12,278	68,004	39,937
Gross income	$499,387	$567,020	$639,015	$620,314	$123,278	$152,217	$2,915,380	$2,192,888	$1,037,170	$390,618
Deductions from gross income	290,341	284,916	454,965	420,277	139,750	147,477	....	....	798,684	787,812
Net income	$209,046	$282,104	$184,050	$150,036	*$16,482*	$4,740	$1,065,478	$1,039,723	$238,476	*$397,195*
Operating ratio	0.806	0.788	0.775	0.784	....	....	0.756	0.759	0.643	0.641

	Hudson & Manhattan R.R., New York, N.Y. (Revised)		**Interborough Rapid Transit Co., New York, N.Y.[19]**		**Long Island Railroad, New York, N.Y.**		**New York Transportation Co., New York, N.Y.[3]**		**New York State Railways, Rochester, N.Y.**	
	1929	1928	1929[9]	1928[9]	1929	1928	1929	1928	1929	1928
Railway operating revenues	$8,964,656	$8,925,508	$69,174,294	$67,205,294	$41,326,194	$40,532,572	$6,730,730	$7,703,314	$9,126,523	$9,658,535
Railway operating expenses	3,800,775	3,907,181	39,084,146	37,712,711	27,734,679	28,434,356	5,465,586	5,731,454	7,623,293	7,445,011
Net revenue, railway oper	$5,163,881	$5,018,328	$30,090,148	$29,492,582	$13,591,515	$12,098,215	$1,265,144	$1,971,860	$1,563,231	$2,213,523
Taxes	950,433	1,008,958	2,393,735	3,200,615	2,942,186	2,707,707	519,611	486,544	571,135	583,732
Operating income	$5,827,438[6]	$5,564,052[6]	$27,696,413	$26,291,966	$10,649,328	$9,390,508	$745,333	$855,316	$932,061	$1,630,459
Non-operating income	442,221	399,231	561,435	297,026	899,575	834,258	234,175	192,509	_105,340	30,997
Gross income	$6,269,660	$5,963,283	$28,257,848	$26,588,993	$9,607,518[22]	$8,376,717[22]	$979,708	$1,047,825	$1,037,402	$1,661,456
Deductions from gross income	4,022,450	4,022,226	21,989,632	21,622,776	3,253,842	3,694,060	8,250	3,563	1,501,390	1,501,899
Net income	$2,247,210	$1,941,057	$6,268,216	$4,966,216	$6,353,676	$4,682,656	$971,458	$1,044,262	*$463,987*	$159,556
Operating ratio	0.424	0.438	0.565	0.561	0.671	0.701	0.812	0.744	0.835	0.781

	Cincinnati Street Ry., Cincinnati, Ohio		**Cincinnati, Hamilton & Dayton Ry., Dayton, Ohio[7]**		**Lake Shore Electric Ry., Sandusky, Ohio**		**Oklahoma Railway, Oklahoma City, Okla.**		**Lehigh Valley Transit Co., Allentown, Pa.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues	$8,819,944	$8,819,116	$1,182,055	$1,151,905	$1,871,693	$1,899,166	$2,289,887	$2,011,522	$4,220,636	$4,314,937
Railway operating expenses	6,021,349	6,320,173	983,751[1]	951,496[1]	1,704,566[1]	1,644,867[1]	1,853,508	1,640,139	3,022,681[1]	[1]3,199,996
Net revenue, railway oper	$2,798,594	$2,498,943	....	....	....	....	$436,379	$371,413	....	....
Taxes	693,268	747,318	....	....	....	....	71,761	73,817	....	....
Operating income	$2,105,325	$1,751,624	$198,304	$200,409	*$100,873*[11]	*$13,701*[11]	$364,618	$297,596	$1,197,954	$1,114,941
Non-operating income	24,788	27,549	3,834	19,379	....	....	41,783	46,492	177,941	143,610
Gross income	$2,130,114	$1,779,174	$202,139	$219,788	*$100,873*	*$13,701*	$406,401	$344,088	$1,375,896	$1,258,551
Deductions from gross income	2,126,609	1,764,380	129,721	144,249	354,651	336,639	274,836	266,717	873,691	834,176
Net income	$3,504	$14,793	$72,418	$75,539	*$455,524*	*$350,340*	$131,565	$77,371	$502,204	$424,375
Operating ratio	0.683	0.717	....	....	....	....	0.809	0.800	....	....

	Beaver Valley Motor Coach Co., New Brighton, Pa.		**Beaver Valley Traction Co.,[12] New Brighton, Pa.**		**Pittsburgh Motor Coach Co., Pittsburgh, Pa.**		**Pittsburgh Railways, Pittsburgh, Pa.**		**York Railways, York, Pa.**	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenues	$108,618	$103,402	$540,440	$538,205	$887,072	$728,211	$20,258,007	$20,576,466	$2,841,235	$2,688,243
Railway operating expenses	85,381	81,940	359,220	369,300	703,583	543,644	15,272,740	15,627,144	1,637,375[1]	[1]1,510,298
Net revenue, railway oper	$23,237	$21,461	$181,220	$168,905	$183,488	$184,567	$4,985,267	$4,949,322	....	....
Taxes	577	2,808	4,303	7,466	6,185	21,282	535,459	569,624	....	....
Operating income	$22,660	$18,653	$176,917	$161,439	$177,303	$163,284	$4,449,808	$4,379,698	$926,217	$901,127
Non-operating income	6	20	2,905	4,071	5,989	1,493	106,566	118,618	94,356	76,519
Gross income	$22,666	$18,673	$179,822	$165,510	$183,292	$164,778	$4,556,374	$4,498,316	$1,020,573	$977,646
Deductions from gross income	14,852[15]	16,864[15]	175,801[13]	163,006[13]	169,479[14]	137,657[14]	4,540,469	4,487,830	250,586	253,135
Net income	$7,814	$1,809	$4,020	$2,504	$13,813	$27,120	$15,904	$10,486	$769,987	$724,511
Operating ratio	0.786	0.792	0.665	0.686	0.793	0.747	0.754	0.760	....	....

	Seattle Municipal St. Ry., Seattle, Wash.		**London Street Railway, London, Ont.**		**Saskatoon Municipal Ry., Saskatoon, Sask.**		**Buenos Ayres Lacroze Tramways, Buenos Ayres, Argentina, S.A.[10]**		**Brisbane Tramways Department, Brisbane, Australia**	
	1929	1928	1929	1928	1929	1928	1929[9]	1928[9]	1929	1928
Railway operating revenues	5,556,242	5,627,098	$592,844	$618,961	$396,282	....	7,890,071	7,973,709	£794,470	£810,954
Railway operating expenses	4,705,739	4,793,340	495,219	519,690[1]	260,179	....	5,096,734	5,199,833	584,390	607,711
Net revenue, railway oper	850,503	833,708	$97,625	....	$136,103	....	....	....	£210,080	£203,243
Taxes	....	....	11,471	....	15,557	....	....	....	[21]	[21]
Operating income	850,503	833,758	$86,154	$99,271	$546	....	2,793,337	2,773,876	£210,080	£203,243
Non-operating income	9,046	24,936	*51,625*[2]	*48,625*[2]	....	....	....	....	....	....
Gross income	859,549	858,694	$34,529	$50,646	$92,544	....	2,793,337	2,773,876	£210,080	£203,243
Deductions from gross income	612,394	647,082	31,199	44,165	106,218	....	1,426,384	1,550,901	202,474	197,125
Net income	247,155	211,612	$3,330	$6,481	$14,326	$12,304	1,366,953	1,222,975	£7,606	£6,118
Operating ratio	0,847	0,852	0.835	....	0.657	....	....	....	....	....

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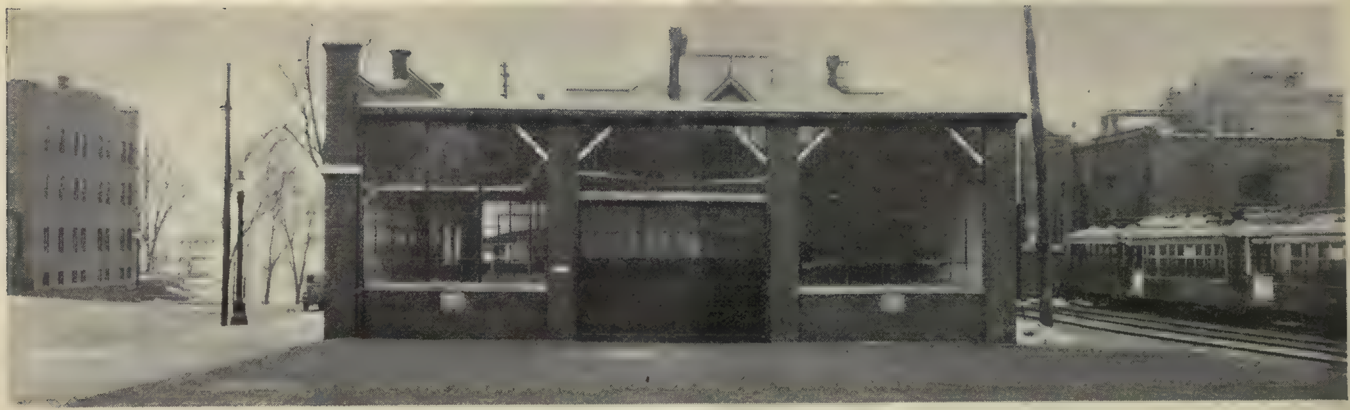
[1] Includes taxes. [2] Depreciation. [3] Excluding New York Railways Corporation. [4] Depreciation of $598,678 deducted. [5] Before depreciation. [6] Includes net income other than railway operations, $1,613,991 in 1930 and $1,554,683 in 1929. [7] Name changed to Cincinnati & Lake Erie R.R. Jan. 1, 1930. [8] After depreciation of $616,799 in 1929 and $571,033 in 1928. [9] Years ended June 30. [10] Figures are in Argentine paper pesos. [11] After depreciation of $268,000 in each year. [12] Including Pittsburgh & Beaver Street Ry. [13] Includes depreciation of $48,457 in 1929 and $42,569 in 1928. [14] Includes depreciation of $144,115 in 1929 and $117,103 in 1928. [15] Includes depreciation of $12,426 in 1929 and $14,091 in 1928. [18] Revised statement. [19] On the basis of the preferential deficits under Contract No. 3 and the Elevated extensions certificate without regard to the objections made by the Transit Commission to certain items in the accounting. [20] After deducting loss of auxiliary operations, $6,215 in 1929 and $6,397 in 1928. [21] No taxes are charged against operation. [22] After deducting equipment and joint facility rents.



First unit of sectional garage built by Erie Railways with a view to future expansion

New Garage Built on Unit Plan

ANTICIPATING future expansion of bus service and equipment, the Erie Railways, Erie, Pa., has built a new storage garage, so designed that an additional unit can be built on to the present structure when more space is required. The first unit is approximately 50 ft. x 100 ft. and holds from twelve to fourteen buses. A clear span of 100 ft. was specified for this section with the idea that the next few years would justify another 50-ft. unit. The columns in the rear are stiffener columns only, to be removed when the second unit is built, and the back wall consists of 8-in. cinder blocks which can also be removed.

The entire floor is sloped to the center where graded drains are installed instead of buried sewers, making the entire building a wash-rack. The water outlet is fixed with a swinging overhead hose that makes the washing of coaches in any position on the floor easy and practical. The open grates drain into a catch basin 6 ft. deep by 36 in. in diameter, which is easily accessible for cleaning. Heat is uniformly distributed at low cost through three Erie unit heaters. Steam for these heaters is purchased from a central community plant. Doors are of the overhead type and are manually operated. The front doors are built on an approximate 2 per cent grade.

Fire protection is afforded by a 60-nozzle automatic sprinkler system together with three large extinguishers for emergency purposes. The building at present is used for storage only.

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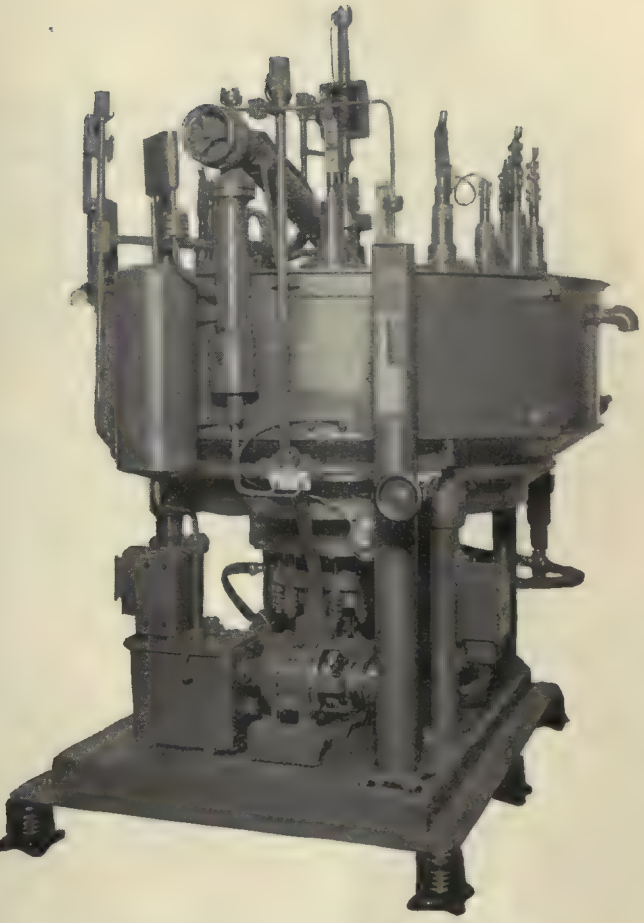
Survey to Show Shifts of Business

DETERMINATION of the shifting of business locations in a representative city soon will be undertaken by the Commerce Department to establish the trend of migration that is going on in cities throughout the country from downtown districts to outlying communities. Baltimore has been chosen for the study. Using the trial census of distribution made in 1926 and the returns from the national census of distribution that are beginning to come in, a trend can be shown over three years.

Trade experts, transportation men, and economists consider this study of far-reaching importance. It is believed that it will reveal, in addition to the outward trend, a definite minor movement in the reverse direction, from uptown sections to the central business area. Business establishments will be placed in twelve major classifications. Each will be denoted on a map by a colored dot. As the map will show the street car lines and the bus routes, it will be possible to draw a fairly accurate conclusion as to the relationship that exists between mass transportation and desirable business locations.

Rear columns and back wall of the new garage can be removed when additional space is required

Development in Design and Manufacture Have Made Possible the Construction of Rectifiers of Large Ratings and High Voltages. These Machines Are Now Suitable for Installations Where Synchronous Converters Previously Were Considered Necessary



General appearance of a 1,000-kw., 600-volt mercury arc rectifier

Mercury Arc Rectifiers Meet Transportation Demands

By

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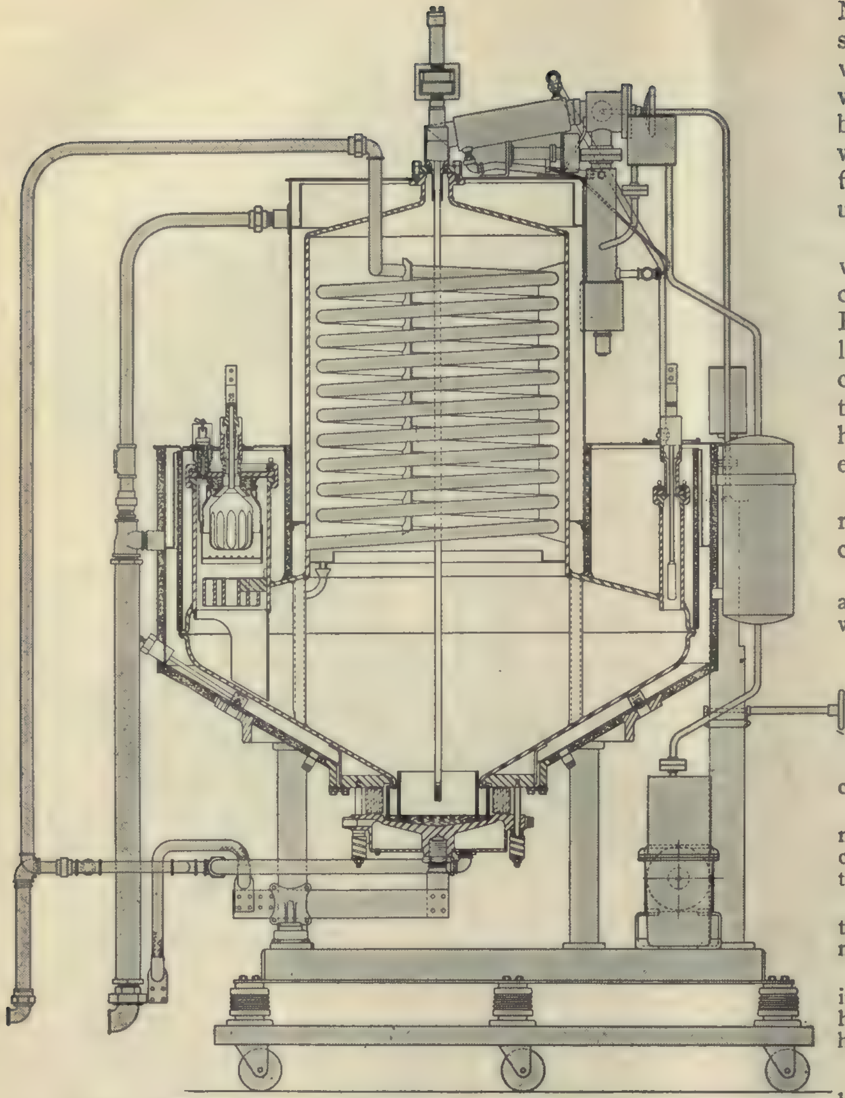
Erie, Pa.

WHILE the principle of the mercury vapor rectifier was discovered about the end of the last century, it is only within recent years that it has progressed very far beyond the status of laboratory equipment. Today, however, it is being built to do work which formerly was considered about the limit possible with synchronous converters or motor-generator sets. In the commercial sizes its performance is equal to or better than that of the best rotating equipment so far designed.

Since the principal part of the loss in the mercury converter is the result of a constant drop in potential between the electrodes, it follows that the efficiency is nearly the same at all loads. In sharp contrast with rotating machinery, the efficiency is very high at light loads. Accordingly, the rectifier is of particular advantage where the load factor is low. This characteristic fits in particularly well for railway work, in which the fluctuations of current are large and the load factor runs from 25 to 50 per cent. Normally, the voltage regulation of a rectifier is approximately 5 per cent over almost the entire range of loads. The power factor is not subject to adjustment as with synchronous machinery, but is approximately 95 per cent over the range from three-quarters to one and one-half times full load, dropping off somewhat as the load is decreased beyond the lower limit. The power factor is due partly to wave distortion and consequently is not a true measure of the reactive current in the transmission system. Furthermore, the frequency of the system does not in any way affect the operation of the rectifier. Of course the auxiliary equipment must be designed for the frequency on which the rectifier is to be operated.

Since the voltage drop within the rectifier is more or less constant, depending on the internal design, it follows that the rectifier has higher efficiency almost in direct proportion to the voltage impressed on it. Accordingly, the higher the voltage the higher the efficiency of conversion in the rectifier. Commercial rectifiers are being built for 3,000-volt direct curent, but this is by



A section through the 3,000-kw., 3,000-volt rectifier for the Delaware, Lackawanna & Western Railroad, showing the dome and cooling coil

no means the limit of the output voltage. Rectifiers have been built to give 15,000 volts, but so far only in small capacities. In general, however, there appears to be no limit to the voltage possibilities of the rectifier.

For low voltages the efficiency of the rectifier is no better than the efficiency of rotating equipment. At voltages below those ordinarily used for electric railways, the rectifier cannot compete at normal load with the efficiency of the synchronous converter. Its use under such conditions is limited to special places where quietness in operation, freedom from attention and lightness in weight are determining factors. So far as the design goes, however, high voltage with low current and low voltage with correspondingly high current seem to be equally satisfactory with regard to operation. There is, of course, a difference in design between high current and high voltage construction.

Possibilities of Rectifier Seen Early

Early in the development of the mercury arc rectifier, at which time it consisted of a set of electrodes in a glass vessel, it was recognized that the device was capable of converting power in relatively large quantities. It was apparent that the material used for the containing vessel for large rectifiers could not be made of glass. As early as 1905 attempts were made to use an iron tank. Naturally the early metal tank rectifiers resembled the glass tube type. There was a water-cooled cylindrical chamber or dome with the mercury pool or cathode at the bottom. Most of the work done before the war was in the development of power rectifiers with the so-called "side arm" tank, using three anodes.

Although the first experimental rectifiers were built in this country, following the discovery of the phenomenon by Peter Cooper Hewitt in connection with the mercury vapor lamp, prior to the war the commercial applications of large rectifiers to distribution systems were made in Europe. After the war, however, preparations were made for active exploitation in the United States.

Early in the development of the power rectifier, certain fundamentals of design and construction became apparent:

1. The vacuum chamber must be vacuum tight and as nearly as possible free from gases which will be released during operation.
2. The size and construction of the vacuum chamber must be such as to permit sufficient cooling to prevent development of high temperatures and consequently vapor pressures above safe operating limits.
3. The vacuum chamber must be so designed that condensed mercury will be returned to the cathode.
4. Construction of the anode and cathode seals must be such that they are vacuum tight under all conditions and are not affected by high temperatures.
5. Anodes must be so constructed and protected that mercury cannot splash on them and so that no mercury will condense on them.
6. Anode material must be capable of withstanding high temperatures, must be a good radiator of heat, and must release absorbed gases readily when heated.

Subsequent development of the rectifier has, to a very large extent, involved the determination of the best means to satisfy these fundamental requirements.

In modern rectifiers the vacuum chambers are made up from special steel plate of non-porous structure, having the lowest possible content of absorbed gases or impurities. The plate is spun or pressed into the required shapes, and the parts are welded together by the atomic hydrogen process. This has been found very satisfactory. Special care must be taken to produce a uniform weld, free from defects. The welds, particularly on the anode necks, must be made without affecting previous welds. After the vacuum chamber is completely welded, it is annealed to relieve stresses which may have been set up. Finally, the interior of the vacuum chamber is cleaned carefully to remove all scale and foreign matter.

There are certain quite definite limits of vapor pressure in the rectifier which must not be exceeded to maintain good operation. Since the vapor pressure is a function of the temperature, the ability of a given rectifier to carry load is determined largely by the effectiveness of the cooling. In low capacities, rectifier cooling is relatively simple, as normal construction provides sufficient surface for the purpose. In larger rectifiers, it is necessary to maintain a minimum distance between anodes and cathode to keep the arc loss as low as possible. Obviously this limits the area of the vacuum chamber and consequently the available surface for cooling. Accordingly, the higher current rectifiers are often provided with an additional circular cooling chamber or dome rising from the vacuum chamber inside the ring of anodes. Further provision for cooling can be obtained by the use of auxiliary cooling coils in the dome or vacuum chamber.

Condensation of the mercury vapor occurs at all points on or near the walls of the chamber. Consequently, the chamber must be so designed that the condensed mercury will drain back immediately into the cathode. Mercury which is allowed to trap in any portion of the chamber other than the cathode is a hazard as under certain conditions it may attempt to function as a second cathode.

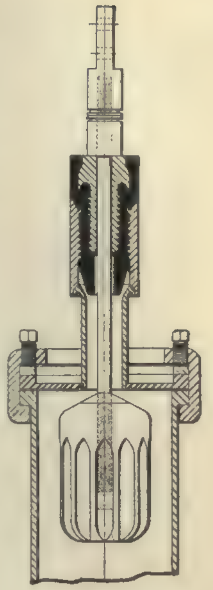
AIR-TIGHT SEALS ESSENTIAL TO OPERATION

The anodes and cathode of a rectifier must be insulated from the vacuum chamber. Some of the most perplexing problems in the development of the rectifier have been in connection with the production of an insulator which will withstand high mechanical and electrical stresses and at the same time maintain a high degree of vacuum. Numerous plans have been tried, the most common of which employ porcelain as the insulating material. With this design the anode is supported by a flange resting between two percelain insulators, the whole being tightly clamped to the anode flange of the vacuum chamber. Gaskets of soft metal placed on each side of the porcelain insulators aid in obtaining a tight joint. Due largely to the unequal expansion and contraction of the iron and porcelain there is almost constant leakage through the insulator system. Several methods have been employed to reduce this leakage. One is to provide a groove in the surfaces which comprise the seals and maintain a vacuum in this groove. Another method is to provide a groove and keep it filled with mercury so that any leakage into the vacuum chamber will be of mercury instead of air.

An attempt to obtain a better insulator and seal was made by using a glass cylinder to support the anode, the glass actually being welded to the metal anode stem and flange. In this way a tight seal was made, but it was not mechanically rugged. Later developments have resulted in the production of a simple and effective insulator and seal in which the anode is joined to and effectively insulated from its supporting sleeve by vitreous insulation molded in place under high temperature and pressure.

Usually the cathode insulator has been a porcelain ring with soft metal gaskets to make the junction vacuum tight. Inasmuch as the cathode is not subjected to the high and fluctuating temperatures that exist at the anode, this construction has been fairly satisfactory. However, it is quite probable that other insulators with more mechanical strength soon will be available.

The operation of the rectifier is dependent on the emission of electrons from the mercury pool or cathode which are attracted to the positively charged anode. If mercury is permitted to lodge or condense on an anode, it is very likely to emit electrons, changing the anode into a cathode and resulting in an arc-back. Baffles or shields are therefore arranged to protect the anodes from mercury splash from the cathode, and the anode construction must be such that mercury cannot condense on them. There is a possibility of mercury condensing on an anode when the load is not sufficient to keep its temperature high enough. Accordingly, anode heaters may be used to maintain the anodes at a safe temperature.



Assembly of graphite anode with a seal of vitreous insulation material, as used in a modern rectifier

Selection of the best material for anodes has received considerable attention. Until about four years ago, steel was used almost universally for anodes in the commercial metal tank rectifier. The glass rectifier has used graphite anodes almost entirely. In the last few years it has been found that a special graphite anode used in the metal tank rectifier has been the means of materially improving the operation. Besides meeting the fundamental requirements, it does not deteriorate under high temperature in the vacuum tank and is not damaged by arc-back.

The development of the 3,000-volt rectifier has led to an extensive investigation of the deionization of the vapor in the vicinity of the anode by means of plates or grids placed in front of them. A cylindrical insulated shield is placed around the anode. Inside of this shield and directly below the anode at a critical distance is inserted a grid or plate electrically connected to the anode shield. The shield and grid are energized from an auxiliary transformer so as to place them at a potential in the desired phase relation to the anode potential. The grid thus installed and excited acts to deionize the vapor in the vicinity of the anode each time the anode voltage decreases through zero before the anode voltage can reach a negative value sufficient to re-establish and produce an arc-back. The deionizing action of the grid has proved very successful in reducing this tendency.

The evacuating system is of extreme importance in the successful operation of the rectifier. As constituted in most modern rectifiers, the evacuating system includes a high vacuum or condensation pump which traps gases which may be liberated or leak into the tank and exhausts them into an intermediate chamber which in turn is exhausted by a motor-driven rotary oil-sealed pump, sometimes called the roughing pump. Originally, the evacuating system was made up of pumps which had been developed for laboratory use. These did not prove adequate for service. It was necessary to develop complete new evacuating systems with reliable roughing pumps and a much higher speed condensation pump in order to take care of any gas emission without interruption in the event of a short circuit or a serious overload. In the past, probably the most serious concern of operators has been arc-backs. These have been eliminated in modern rectifiers to the extent that they are no longer a problem in maintaining continuous service, and apparently they do not have any injurious effect on the rectifier. It is reasonable to expect ultimately the entire elimination of the arc-back.

Since with polyphase power supply, it is possible to transform from any number of phases to any other number, it is likewise possible to utilize any number of phases for impression on the rectifier that is desirable. As the number of phases is increased, the distortion of the current and voltage waves on the direct-current end of the rectifier is decreased. Hence there is a decided advantage in the use of the greatest possible number of phases consistent with economy in manufacture. It is the usual practice to provide 6-phase or 12-phase connections. Three-phase operation produces wave forms which are not desirable and more than 12 phases involve complications in transformer design which usually are not justified.

The number of phases of the rectifier should not be confused with the number of anodes. To some extent the number of anodes determines the capacity of a unit. A certain type of anode construction will be capable of carrying a specified current. For example, a rectifier with six anodes may be capable of an output of 500 kw. By doubling the number of anodes of similar construction, and, of course, increasing the size of the tank in the proper proportion, an output of 1,000 kw. can be obtained.

In some instances the cooling system of the rectifier presents a difficult problem. As the rectifier is improved it is probable that other methods of cooling will appear. Another thing that would simplify rectifier construction and installation is the elimination of the evacuation system. Possibly future improvements will permit evacuating at the factory, sealing, shipping, installing and operating for an extended period without attention. These possible improvements in the rectifier would add materially to its already recognized advantages.

Many Large Rectifier Installations Made

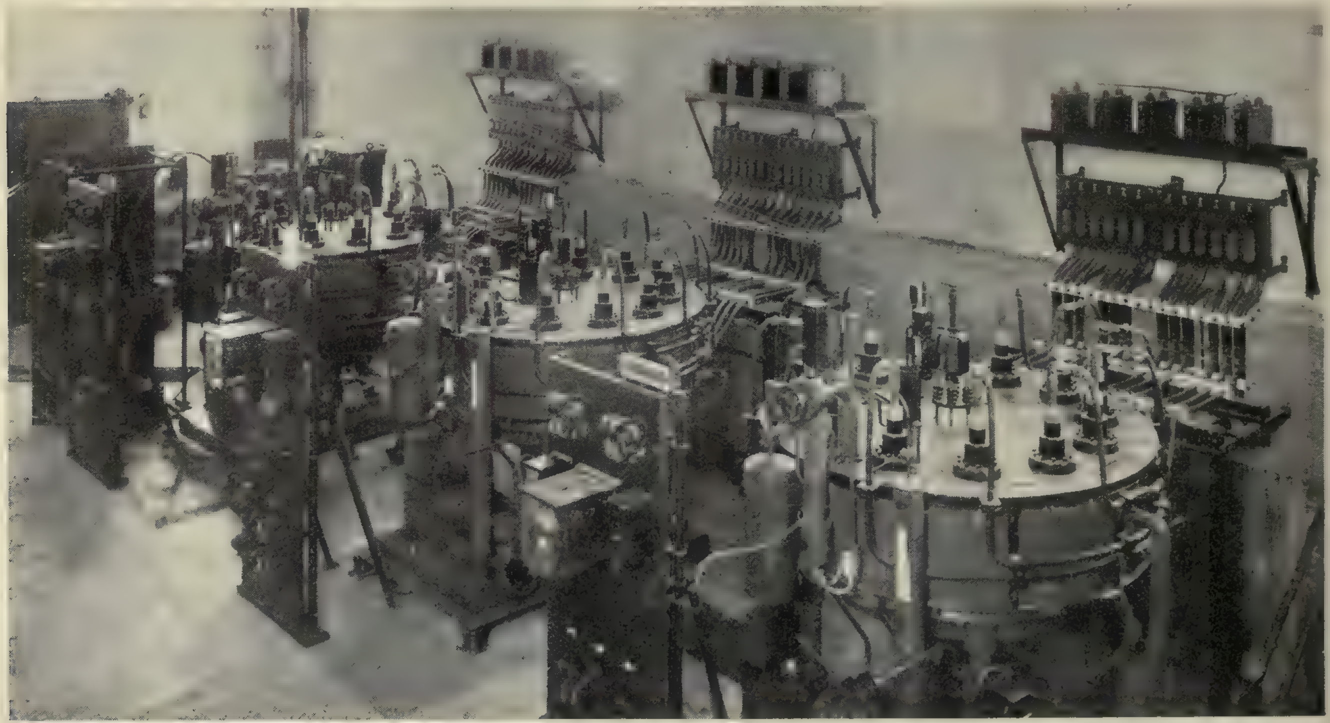
At the present time the General Electric Company has on order or in service approximately 115,000 kw. in rectifiers in the United States. The outstanding installation is that of the Delaware, Lackawanna & Western Railroad electrification extending from the Hoboken terminal to the suburban area served from it. This system will receive power for the trolley wire entirely from 3,000-volt rectifiers. The total installed capacity will be 37,000 kw. with a spare 3,000-kw. unit. The rectifier units are being built in sizes of 1,500 kw., 2,000 kw., and 3,000 kw. These ratings are nominal. In addition the units will be capable of delivering 300 per cent load for a period of five minutes, and of carrying momentary overloads in excess of this amount. Under the supervision of the consulting engineers, Jackson & Moreland, and the engineers of the railway, the sample rectifier for this installation has been subjected to what probably was the severest and most extensive series of duty cycles and short circuit tests ever put on any piece of electrical apparatus, in order to demonstrate its suitability for the service.

The flexibility of the rectifier is demonstrated in the recent installation of the Eastern Massachusetts Street Railway at Fall River. This installation consists of three 1,000-kw., 600-volt units with manual control. These units are arranged to operate from either of two power systems, one a 25-cycle, 13,200-volt and the other a 60-cycle, 22,860-volt circuit. The control equipment provides for instantaneous change from one source of supply to the other.

Within the next few months the Boston Elevated Railway will install a similar substation containing two 3,000-kw., 660-volt units with complete automatic and supervisory control. This substation also will be arranged for operation from either a 25-cycle or 60-cycle power circuit. The rectifier unit also can easily be arranged to supply two direct-current voltages by simple changeover methods.

The New York Board of Transportation will install seven 3,000-kw., 600-volt rectifiers with complete automatic and supervisory control to supply power for the new Eighth Avenue subway in New York City. Rectifiers were selected for this installation, as they offered a means of solving the ventilation problem and are noiseless. The equipments will be installed in underground pockets along the subway lines.

Before the end of this year rectifiers will be in operation in every type of rail transportation service in the United States.



The three 1,000-kw., 600-volt rectifiers in the Fall River substation of the Eastern Massachusetts Street Railway are arranged for operation on either a 25-cycle or a 60-cycle supply

Bus station in front of Paterson City Hall. The tracks in the foreground are used by interurban car lines

Buses Replace Cars

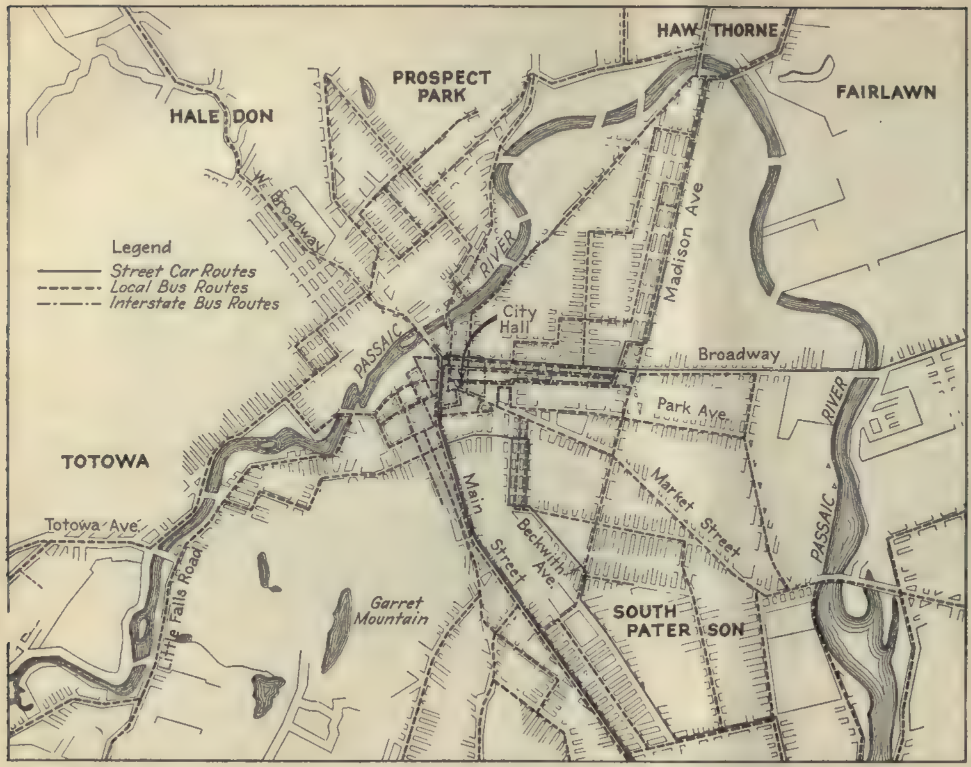
In Local Service at Paterson

Public Service Co-ordinated Transport has completed substitution begun several years ago. Narrow streets a handicap to rail operation. Three interurban car lines retained

SUBSTITUTION of buses in place of cars for local transportation in Paterson, N. J., has been completed by Public Service Co-ordinated Transport. The process has been gradual, extending over a period of several years. In all, nine street car lines have been discontinued and three retained. The latter are interurban lines connecting Paterson with Newark, Hoboken and Edgewater, the New Jersey terminal of the Hudson River ferry from 125th Street, New York City. About 30 miles of track have been abandoned on the local lines and 15 miles retained for the use of the interurban cars. Several factors were influential in shaping the company's policy of substituting bus service for car service on the local lines. One reason was the narrowness of many of the streets, which seriously hampered car operation. When the system was originally laid out most of the local lines were built as single track with turnouts. This made it difficult to adjust the headways according to the riding demands. Extra carrying capacity had to be provided by double-heading, and in some instances triple-heading certain scheduled trips instead of changing the schedule and shortening the headway. Moreover, vehicular traffic caused many delays on these narrow streets.

Another influential factor was the greater popularity of the buses with the public. This was due in large measure to certain conditions peculiar to Paterson. The

Substitution of buses for cars has saved the expense of de-rail men at numerous grade crossings such as the one shown above



In Paterson, N. J., Public Service Co-ordinated Transport has substituted buses for street cars on a number of local routes. Operation of three interurban car lines has been continued via Broadway, via Main Street and via Beckwith Avenue

chief industry is silk manufacturing. Chemical properties of the water of the Passaic River which passes through the city make its banks an ideal location for carrying on this business. The oldest mills are grouped around the plant of the Society for Useful Manufactures founded by Alexander Hamilton, more than 100 years ago. More recently, mills have been built in other localities along the Passaic, as well as a number at some distance from the river. Other industries have sprung up from time to time, but few of them have flourished for long.

This concentration upon silk manufacturing has produced a community which is closely knit both physically and spiritually. Although the city has a population of 145,000, it occupies an area of only 8.35 square miles. Its development has been approximately equal on all sides of the center. Distances from the residential districts to the central shopping district are comparatively short. On the other hand, distances from the residential communities to some of the mills are rather long. The result has been to accentuate the rush-hour traffic peaks on the transportation lines.

Birney Cars Introduced

Shortly after the end of the World War the Public Service equipped all its local lines in Paterson with Birney cars, a total of 100 units of this type being bought for this purpose. It was hoped by this means to encourage off-peak riding by providing faster and more frequent service, as well as to decrease operating expenses. Probably this expectation would have been realized had it not been for another factor which then entered into the situation. During the war the jitney had gained a foothold in Paterson. After the war this form of competition increased with phenomenal rapidity. Permits were issued right and left by the city authorities entirely regardless of the adequacy of existing facilities. A large majority of the jitneys operated in direct competition on the same streets as the Public Service cars.

The jitneys became very popular because the fare was less than that of the cars, because their service was somewhat faster and more convenient in certain ways, and because the jitney operators were personal friends of many of the passengers. This last was due to the habit of the workers to change frequently their places of employment from one silk mill to another, giving them a wide acquaintance among their fellows. Many of the jitney drivers were former silk workers and well known to the mill hands, who preferred to patronize their friends rather than to use the facilities provided by Public Service.

The fare differential in favor of the jitneys also appealed strongly to this class of riders, most of whom were foreigners, many of them women. Another factor that was in favor of the jitneys was the practice of their operators of abandoning their regular routes to make special trips to and from the mills, and to deliver the workers at their doors.

Bus operation on narrow streets encounters fewer delays than formerly occurred with car operation

Thus the railway lost traffic despite the introduction of Birney cars. As buses of larger capacity replaced the original vehicles, this loss was increased. During this period the development of the private automobile also took business away from the cars. This factor, however, was of less direct importance in Paterson than in many other cities, because the ratio of ownership to population is comparatively low.

Indirectly, the private automobile has added to the difficulties of car operation by creating extremely serious traffic congestion. During the busiest period of the day the average speed in trolleys in the business district dropped to less than 2 m.p.h. Despite the narrowness of the streets, parking regulations have been liberal. Under these difficult traffic conditions, the buses have been able to operate somewhat more satisfactorily than the cars.

In 1923, a law was passed in New Jersey requiring that in future all permits for buses to operate in territory already served by existing facilities must receive a certificate of convenience and necessity from the state Board of Public Utility Commissioners. This resulted in stabilizing the bus situation in Paterson. Soon afterward the Public Service began buying up buses which operated in direct competition with its cars, and co-ordinating the service. By this time there were more than 150 buses in operation in the city, and the number of cars on the local lines had been reduced to about half the former number.

The process of co-ordination resulted in further reduction in the car service. Gradually one line after another was entirely abandoned, until the last one was given up in the early part of 1929. The three interurban lines which remain do a certain amount of local business. Inasmuch as each of these lines is on a comparatively long headway, however, the part they play in the local transportation situation is relatively small.

ADDITIONAL TERRITORY SERVED

Besides their ability to operate more satisfactorily in narrow streets, and to make special mill trips, the buses have certain other advantages over the cars in Paterson. In the last few years the city has spread out somewhat, and new residential areas have sprung up beyond the ends of the local car lines. It has been a simple matter to extend the bus routes to serve these localities.

Due to the passage of the Erie and the New York, Susquehanna and Western Railroads through the heart of the city there are numerous grade crossings of the steam and electric lines. With one-man car operation it was necessary for Public Service to have de-rail men at these crossings. With bus operation this expense is eliminated, protection at the crossings being afforded by the regular flagmen of the steam railroads.

Grade separation was in process on the main line of the Erie through the city. While the effect of this project would have been to obviate the need for some of the de-rail men, it would also have involved the heavy expense of relocating the Public Service tracks had street car service been retained on the local lines. Moreover, a considerable portion of the street railway trackage in the city was showing signs of age and would soon have required reconstruction. This expense also has been saved by the substitution of buses for cars.

Operating figures for the present bus service and the former local car service cannot be compared satisfactorily. Originally all the buses were owned by individuals from whom reliable records are unobtainable. Even now there remains a sufficient number of individually owned buses in operation to render valueless any comparison of passengers carried, vehicle-miles, etc.

The advantages of the bus as a local transportation vehicle in Paterson can be stated only in general terms. Briefly summarized, they are:

1. Flexibility of schedule greater than on single-track car lines.
2. Ability to make special mill trips.
3. Increased speed through narrow streets.
4. Ability to serve districts beyond car lines.
5. Elimination of derail men at steam railroad crossings.
6. Saving in track reconstruction expense.

1835 Steel Poles Used for Chicago Trolley Bus System

Combination digger and pole setting machine cut installation costs materially

WHEN the Chicago Surface Lines received official order from the Illinois Commerce Commission on March 6, 1930, to operate trolley buses over seven routes within four months the company placed what is believed to be the largest order of tubular steel trolley poles placed by any street railway in ten years.

The order for 1,835 Elreco, three-section, tubular steel poles was placed on March 10, 1930, and specified delivery within 38 days. This amounted to almost 913 tons complete with extra heavy weight ground collars.

A pole-setting machine such as the one shown in the illustration greatly facilitated the installation of these poles. An average of 40 poles per day were set and concreted. This machine, manufactured by the Highway Trailer Company, and purchased for this particular installation, not only was more efficient than the line truck but assisted in cutting the cost of the pole setting considerably under the estimate.

1929 Was a Successful Year for the Electric Railways

Net income was increased on nearly all properties from which reports were received, and combined surplus was five times that for 1928. Traffic held up well, and with some increases in fares the gross revenues were greater. Higher schedule speeds, reduction of wastes and judicious extension of bus service all contributed to improved showing

By
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Director of Information Service
American Electric Railway Association

REPORTS for the year 1929 which have come to hand show that it was one of the most successful years the electric railways have had since the war. Almost without exception they had increases in net income, despite a small decrease in the number of passengers carried. A group of 202 such reports which have been combined and are analyzed in the accompanying tables show that after increasing depreciation allowances by $1,306,928, paying out $703,208 more in dividends and appropriating from net income $841,830 for other purposes, the surplus remaining was more than five times that of the previous year—$4,035,719 in 1929 against $805,423 in 1928.

Several factors were responsible for this improved showing. A higher average fare offset the small decrease in traffic; operating expenses were reduced, as were taxes and fixed charges. The latter change reflects financial and property reorganizations. While no bus figures are included in the above comparison, undoubtedly their use in replacing some unprofitable rail lines and in extending service where new track was not justified has had a favorable effect on the rail earnings.

Table I—Combined Operations of 287 Electric Railway Companies and 166 Controlled Bus Undertakings*

	1929	1928	Increase or *Decrease*** Total	Per Cent
Operating revenue	$842,841,667	$833,369,839	$9,471,828	1.14
Operating expenses†	617,447,204	613,862,539	3,584,665	0.58
Net operating revenue	$225,394,463	$219,507,300	$5,887,163	2.68
Operating ratio, per cent	73.26	73.66	*0.40*	*0.54*
Miles of track and bus route[1]	37,072.60	35,924.22	1,148.38	3.20
Revenue passengers[2]	11,310,575,712	11,327,443,315	*16,867,603*	*0.15*
Total passengers[2]	14,263,856,398	14,272,056,435	*8,200,037*	*0.06*
Revenue car and bus-miles[3]	2,142,503,058	2,113,898,282	28,604,776	1.35
Total car and bus-miles[3]	2,154,011,466	2,125,723,398	28,288,068	1.33

*These preliminary tables include the reports of all companies received up to April 30, 1930. The income statement is not carried beyond "Net Operating Revenue" because many of the companies included are combination railway, light and power companies that do not make any segregation of their railway taxes or fixed charges.

**Decreases are indicated by *italic figures*.

†Includes depreciation to the extent that reporting companies included it in their operating expenses.

[1] Bus route, not round trip miles of route, represents miles of separate roads traversed; includes 155 bus undertakings.

[2] Includes 286 electric railways and 165 controlled bus undertakings.

[3] Includes 285 electric railways and 166 controlled bus undertakings.

The significance of the year's results lies in the demonstration that the industry can adjust itself to changed traffic conditions when they approach stabilization, as they did in 1929. Last year's electric railway traffic approximately equaled that of 1928, although nearly 2,000,000 more automobiles were in use. Measures which progressive companies took to adapt themselves to changed conditions produced gratifying increases in net. If such conditions can be maintained over a period of years the industry can undoubtedly be placed in a stronger position. As to the immediate outlook, the long-awaited saturation point of automobile production has not yet been reached; the problem of street traffic congestion gives no evidence of approaching solution. And until these two things are worked out the niche to be assigned in the future to the business of furnishing local transportation cannot be known.

The 202 companies whose reports form the basis of the above summary represent approximately 58 per cent

Table II—Combined Operations of 286 Electric Railways

	1929	1928	Increase or *Decrease** Total	Per Cent
Railway operating revenue	$763,447,190	$761,456,330	$1,990,860	0.26
Railway operating expenses†	549,915,137	552,314,377	*2,399,240*	*0.43*
Net operating revenue	$213,532,053	$209,141,953	$4,390,100	2.10
Operating ratio, per cent	72.03	72.53	*0.50*	*0.69*
Miles of track	27,493.18	27,798.05	*304.87*	*1.10*
Revenue passengers[1]	10,251,489,410	10,324,025,007	*72,535,597*	*0.70*
Total passengers[1]†	13,109,739,650	13,185,863,563	*76,123,913*	*0.58*
Revenue car-miles[2]	1,868,463,150	1,863,505,597	4,957,553	0.27
Total car-miles[2]	1,878,363,853	1,873,527,832	4,836,021	0.26

*Decreases are indicated by *italic figures*.

†Includes depreciation to the extent that reporting companies included it in their operating expenses.

[1] Reported by 285 companies [2] Reported by 284 companies.

Table III—Combined Operations of 165 Bus Undertakings Controlled by 286 Electric Railways

	1929	1928	Increase or *Decrease** Total	Per Cent
Bus operating revenue	$44,831,103	$37,902,383	$6,928,720	18.28
Bus operating expenses	41,828,968	35,985,255	5,843,713	16.24
Net operating revenue	$3,002,135	$1,917,128	$1,085,007	56.60
Operating ratio, per cent	93.30	94.94	*1.64*	*1.73*
Miles of bus route[1]	8,774.25	7,315.20	1,459.05	19.95
Revenue passengers[2]	438,884,768	378,473,695	60,411,073	15.96
Total passengers[2]	524,996,491	452,430,521	72,565,970	16.04
Revenue bus-miles	179,774,592	155,936,517	23,838,075	15.29
Total bus-miles	181,121,956	157,356,621	23,765,335	15.10

*Decreases are indicated by *italic figures*.

[1] Reported by 155 companies.

[2] Reported by 164 companies.

Part I—Combined Operating Reports of 202 Electric Railways For the Calendar Year 1929 Compared With 1928

Table IV—Combined Income Statement

			Increase or *Decrease**		Cents per Car-Mile[3]		Increase or *Decrease**	
Expenses	1929	1928	Total	Per Cent	1929	1928	Total	Per Cent
Railway operating revenue	$515,915,879	$517,100,517	*$1,184,638*	*0.23*	44.35	44.23	0.12	0.27
Railway operating expenses, excluding depreciation	355,952,412	361,835,743	*5,883,331*	*1.63*	30.60	30.95	*0.35*	*1.13*
Net operating revenue	$159,963,467	$155,264,774	$4,698,693	3.03	13.75	13.28	0.47	3.54
Net revenue, auxiliary operations	1,687,978	1,489,629	198,349	13.31	0.14	0.13	0.01	7.69
Taxes	31,452,256	31,896,802	*444,546*	*1.39*	2.70	2.73	*0.03*	*1.10*
Operating income	$130,199,189	$124,857,601	$5,341,588	4.28	11.19	10.68	0.51	4.77
Non-operating income	9,672,161	9,827,442	*155,281*	*1.58*	0.83	0.84	*0.01*	*1.19*
Gross income	$139,871,350	$134,685,043	$5,186,307	3.85	12.02	11.52	0.50	4.34
Deductions from gross income	83,667,246	84,563,201	*895,955*	*1.06*	7.19	7.23	*0.04*	*0.55*
Net income (before depreciation)	$56,204,104	$50,121,842	$6,082,262	12.13	4.83	4.29	0.54	12.59
Depreciation	31,979,198	30,672,270	1,306,928	4.26	2.75	2.62	0.13	4.96
Dividends	14,646,206[1]	13,942,998[2]	703,208	5.04	.....	.....	.....	.....
Other appropriations	5,542,981	4,701,151	841,830	17.91	.....	. ..	.....	.....
Surplus	$4,035,719	$805,423	$3,230,296	401.07	.....	. ..	.....	.....
Operating ratio, per cent	68.99	69.97	*0.98*	*1.40*	.....	.....	.....	.....
Ratio, net income to operating revenue, per cent	10.89	9.69	1.20	12.38	.....	.....	.....	.....

†The 202 companies included in Table IV and subsequent tables either operate railways only or if they do a joint railway, power and light business make a complete separation of their railway taxes and charges. Complete information on these companies, therefore, is given.

*Decreases are indicated by *italic figures*.

[1] Reported by 37 companies.

[2] Reported by 36 companies.

[3] Based on 200 companies.

Table V—Operating Expenses by Primary Accounts (202 Companies)

			Increase or *Decrease**		Cents per Car-Mile[3]		Increase or *Decrease**	
Expenses	1929	1928	Total	Per Cent	1929	1928	Total	Per Cent
Way and structures, excluding depreciation	$40,973,814	$41,674,599	*$700,785*	*1.68*	3.52	3.56	*0.04*	*1.12*
Equipment, excluding depreciation	38,627,979	40,113,962	*1,485,983*	*3.70*	3.32	3.43	*0.11*	*3.21*
Power, excluding depreciation	48,566,137	48,839,836	*273,699*	*0.56*	4.18	4.18	.....	.....
Conducting transportation	167,263,361	170,097,764	*2,834,403*	*1.67*	14.38	14.55	*0.17*	*1.17*
Traffic	2,328,758	2,377,459	*48,701*	*2.05*	0.20	0.20	.....	.....
General and miscellaneous	58,194,118	58,825,676	*631,558*	*1.07*	5.00	5.03	*0.03*	*0.60*
Transportation for investment—credit	—264,224	—261,433	2,791	1.07	—0.02	—0.02	.....	.....
Total operating expenses, excluding depreciation	$355,952,412[1]	$361,835,743[2]	*$5,883,331*	*1.63*	30.60[4]	30.95[5]	*0.35*	*1.13*
Depreciation								
Way and structures	$9,015,079	$9,858,548	*$843,469*	*8.56*	0.77	0.84	*0.07*	*8.33*
Equipment	9,379,603	8,404,066	975,537	11.61	0.81	0.72	0.90	12.50
Power	1,965,250	2,048,446	*83,196*	*4.06*	0.17	0.18	*0.01*	*5.56*
Undistributed depreciation reported in operating expenses	3,156,146	2,134,550	1,021,596	47.86	0.27	0.18	0.09	50.00
Total depreciation reported in operating expenses	$23,516,078	$22,445,610	$1,070,468	4.77	2.02	1.92	0.10	5.21
Depreciation reported as a deduction from net income	8,463,120	8,226,660	236,460	2.87	0.73	0.70	0.03	4.28
Total depreciation	$31,979,198	$30,672,270	$1,306,928	4.26	2.75	2.62	0.13	4.96

*Decreases are indicated by *italic figures*.

[1] Includes $262,469 undistributed expense.

[2] Includes $167,880 undistributed expense.

[3] Based on 200 companies.

[4] Includes 0.02 cent undistributed expense.

[5] Includes 0.01 cent undistributed expense.

of the electric railway business in the United States. Reports also were received from 84 other companies, but since these combined light and power with railway operations, or for other reasons, the statements could not be included with the complete reports of the main group. The data on railway operating revenues and expenses, car-miles and passengers carried by these 84 companies have been combined with the similar items of the all-rail group to form Table II. The latter table represents about 85 per cent of the entire industry. It serves as a check on the more detailed data prepared for the 202 companies, and shows that it is representative. From his knowledge of the companies involved, the writer believes that the tables of the main group are more

Table VI—Operating Statistics

(202 Companies)

			Increase or *Decrease**	
	1929	1928	Total	Per Cent
Passenger car-miles	1,123,692,836	1,130,440,603	*6,747,767*	*0.60*
Revenue car-miles[1]	1,155,800,883	1,161,535,792	*5,734,909*	*0.49*
Total car-miles[1]	1,162,604,865	1,168,362,902	*5,758,037*	*0.49*
Revenue passengers[2]	6,362,672,831	6,494,155,833	*131,483,002*	*2.02*
Transfer passengers				
Revenue	306,834,139	310,938,709	*4,104,570*	*1.32*
Free[3]	1,533,031,670	1,528,070,959	4,960,711	0.32
Total passengers[4]	8,253,391,568	8,385,464,074	*132,072,506*	*1.58*
Passenger revenue	$482,328,131	$483,890,806	*$1,562,675*	*0.32*
Passenger car-hours[5]	102,743,137	104,231,069	*1,487,932*	*1.43*
Revenue car-hours[5]	103,954,471	105,551,643	*1,597,172*	*1.51*
Total car-hours	104,511,893	106,125,358	*1,613,465*	*1.52*
Miles of single track	20,255.45	20,436.26	*180.81*	*0.88*
Passenger cars operated[6]	24,301	24,674	*373*	*1.51*

*Decreases are indicated by *italic figures*.

[1] Reported by 200 companies.

[2] Reported by 201 companies.

[3] Reported by 31 companies.

[4] Reported by 136 companies.

[5] Reported by 181 companies.

[6] Average maximum number of passenger cars in service daily, reported by 164 companies.

Table VII—Significant Ratios Derived from Tables IV-VI

(202 Companies)

	1929	1928	Increase or *Decrease** Per Cent
Railway operating revenue			
Per mile of single track	25,470	25,303	0.07
Gross income			
Per mile of single track	6,905	6,590	4.78
Passenger revenue			
Per revenue passenger, cents[1]	7.55	7.42	1.75
Per total passenger, cents[1]	5.82	5.75	1.22
Per mile of single track	$23,812	$23,678	0.57
Per passenger car-mile, cents[3]	42.91	42.79	0.28
Per car operated[3]	$16,246	$16,126	0.74
Per passenger car-hour, cents[4]	$4.08	$4.05	0.74
Revenue passengers			
Per mile of single track[1]	315,631	319,355	*1.17*
Per passenger car-mile[5]	5.68	5.77	*1.56*
Per car operated[3]	206,148	207,131	*0.47*
Per passenger car-hour[6]	56	56	....
Total passengers			
Per mile of single track[1]	409,424	412,361	*0.71*
Per passenger car-mile[5]	7.37	7.45	*1.07*
Ratio, transfer passengers to revenue passengers, per cent[7]	31.01	30.43	1.91
Revenue car-miles			
Per mile of single track[2]	57,261	57,007	0.45
Per car operated[8]	39,835	39,202	1.61
Per car-hour[4]	9.47	9.39	0.85
Car-hours			
Per car operated[9]	4,030	4,036	*0.15*

*Decreases are indicated by *italic figures*.

[1] Reported by 201 companies

[2] Reported by 200 companies

[3] Reported by 164 companies

[4] Reported by 181 companies

[5] Reported by 199 companies.

[6] Reported by 180 companies.

[7] Reported by 147 companies.

[8] Reported by 163 companies.

[9] Reported by 151 companies.

Part II—Statistics of 202 Electric Railways Segregated by Type of Territory Served

Table VIII—Operating Statement

	City Lines, 114 Companies				Interurban Lines, 34 Companies				Combined City and Interurban Lines, 54 Companies			
	1929	1928	Increase or *Decrease** Total	Per Cent	1929	1928	Increase or *Decrease** Total	Per Cent	1929	1928	Increase or *Decrease** Total	Per Cent
Railway operating revenue	$394,698,573	$392,867,931	$1,830,642	0.47	$19,630,345	$20,045,576	*$415,231*	*2.07*	$101,586,961	$104,187,010	*$2,600,049*	*2.50*
Ry. oper. expen. (excl. deprec.)	266,485,800	269,581,154	*3,095,354*	*1.15*	14,973,177	15,550,398	*577,221*	*3.71*	74,493,434	76,704,190	*2,210,756*	*2.88*
Net operating revenue	$128,212,773	$123,286,777	$4,925,996	4.00	$4,657,168	$4,495,178	$161,990	3.60	$27,093,527	$27,482,820	*$389,293*	*1.42*
Net revenue, auxiliary oper.	559,235	516,682	42,553	8.24	289,305	147,471	141,834	96.18	839,438	825,476	13,962	1.69
Taxes	24,990,599	25,133,066	142,467	0.57	1,036,999	1,009,482	27,517	2.73	5,424,659	5,754,255	*329,596*	*5.73*
Operating income	$103,781,409	$98,670,393	$5,111,016	5.18	$3,909,474	$3,633,167	$276,307	7.61	$22,508,306	$22,554,041	*$45,735*	*0.20*
Non-operating income	6,604,669	7,012,403	*407,734*	*5.81*	300,069	345,839	*45,770*	*13.23*	2,767,423	2,469,200	298,223	12.08
Gross income	$110,386,078	$105,682,796	$4,703,282	4.45	$4,209,543	$3,979,006	$230,537	5.79	$25,275,729	$25,023,241	$252,488	1.01
Deductions from gross income	61,576,594	61,872,541	*295,947*	*0.48*	5,473,383	5,795,350	*321,967*	*5.56*	16,617,269	16,895,310	*278,041*	*1.65*
Net income (before deprec.)	$48,809,484	$43,810,255	$4,999,229	11.41	—$1,263,840	—$1,816,344	$552,504	....	$8,658,460	$8,127,931	$530,529	6.53
Depreciation	23,729,285	22,721,083	1,008,204	4.44	1,152,672	1,086,216	66,456	6.12	7,097,241	6,864,971	232,270	3.38
Dividends	[1]11,260,032	[1]10,975,668	284,364	2.59	[2]460,010	[3]197,373	262,637	133.07	[4]2,926,164	[4]2,769,957	156,207	5.64
Other appropriations	5,337,198	4,435,940	901,258	20.32	99,602	187,980	*88,378*	*47.01*	106,181	77,231	28,950	37.48
Surplus	$8,482,969	$5,677,564	$2,805,405	49.41	—$2,976,124	—$3,287,913	$311,789	....	—$1,471,126	—$1,584,228	*$113,102*	....
Operating ratio, per cent	67.52	68.62	*1.10*	*1.60*	76.27	77.57	*1.30*	*1.68*	73.33	73.62	*0.29*	*0.39*
Ratio, net income to operating revenue, per cent	12.37	11.15	1.22	11.09	....	....	......	....	8.52	7.80	0.72	9.23

**Decreases* are indicated by *italic figures.* Deficits are indicated by minus signs. [1]Reported by 25 companies. [2]Rep orted by 4 companies. [3]Reported by 3 companies. [4] Reported by 8 companies.

Table IX—Operating Expenses by Primary Accounts

Expenses	City Lines, 114 Companies				Interurban Lines, 34 Companies				Combined City and Interurban Lines, 54 Companies			
	1929	1928	Increase or *Decrease** Total	Per Cent	1929	1928	Increase or *Decrease** Total	Per Cent	1929	1928	Increase or *Decrease** Total	Per Cent
Way and struc., excl. deprec.	$27,661,678	$27,729,703	*$68,025*	*0.25*	$2,383,144	$2,457,644	*$74,500*	*3.03*	$10,928,991	$11,487,251	*$558,260*	*4.86*
Equipment, excluding deprec.	29,564,411	30,828,691	*1,264,280*	*4.10*	1,288,229	1,442,218	*153,989*	*10.68*	7,775,339	7,843,053	*67,714*	*0.86*
Power, excluding depreciation	35,579,502	35,356,518	222,984	0.63	2,236,136	2,392,734	*156,598*	*6.54*	10,750,499	11,090,584	*340,085*	*3.07*
Conducting transportation	131,776,545	133,234,820	*1,458,275*	*1.09*	5,185,718	5,293,621	*107,903*	*2.04*	30,301,098	31,569,323	*1,268,225*	*4.02*
Traffic	1,034,756	1,096,893	*62,137*	*5.67*	380,155	361,058	19,097	5.29	913,847	919,508	*5,661*	*0.62*
General and miscellaneous	40,770,161	41,304,379	*534,218*	*1.29*	3,544,127	3,658,349	*114,222*	*3.12*	13,879,830	13,862,948	16,882	0.12
Transp. for investment—credit	—138,879	—105,115	33,764	32.12	—44,332	—55,226	*10,894*	*19.73*	—81,013	—101,092	*20,079*	*19.86*
Total opera. exp. excl. depr.	[1]$266,485,800	[2]$269,581,154	*$3,095,354*	*1.15*	$14,973,177	$15,550,398	*$557,221*	*3.71*	[3]$74,493,434	[4]$76,704,190	*$2,210,756*	*2.88*
Depreciation												
Way and structures	$6,210,596	$7,142,270	*$931,674*	*13.05*	$330,579	$331,779	*$1,200*	*0.36*	$2,473,904	$2,384,499	$89,405	3.75
Equipment	6,089,529	5,285,624	803,905	15.21	610,097	525,228	84,869	16.16	2,679,977	2,593,214	86,763	3.34
Power	1,067,241	1,157,836	*90,595*	*7.82*	23,397	36,184	*12,787*	*35.34*	874,612	854,426	20,186	2.36
Undistr. deprec. reported in operating expenses	3,153,373	2,131,586	1,021,787	47.94	....	....	......	.....	2,773	2,964	*191*	*6.44*
Total depreciation reported in operating expenses	$16,520,739	$15,717,316	$803,423	5.11	$964,073	$893,191	$70,882	7.94	$6,031,266	$5,835,103	$196,163	3.36
Depreciation reported as a deduction from net income	7,208,546	7,003,767	204,779	2.92	188,599	193,025	*4,426*	*2.29*	1,065,975	1,029,868	36,107	3.50
Total depreciation	$23,729,285	$22,721,083	$1,008,204	4.44	$1,152,672	$1,086,216	$66,456	6.12	$7,097,241	$6,864,971	$232,270	3.38

. Decreases are indicated by *italic figures.* [1]Includes $237,626 undistributed expense. [2]Includes $135,265 undistributed expense. [3]Includes $24,843 undistributed expense. [4]Includes $32,615 undistributed expense.

Table X—Operating Statistics

	City Lines, 114 Companies				Interurban Lines, 34 Companies				Combined City and Interurban Lines, 54 Companies			
	1929	1928	Increase or *Decrease** Total	Per Cent	1929	1928	Increase or *Decrease** Total	Per Cent	1929	1928	Increase or *Decrease** Total	Per Cent
Passenger car-miles	877,896,628	878,745,808	*849,180*	*0.10*	[4]32,032,510	[4]33,804,632	*1,772,122*	*5.24*	213,763,698	217,890,163	*4,126,465*	*1.89*
Revenue car-miles	879,294,628	880,344,886	*1,050,258*	*0.12*	[4]41,926,762	[4]42,819,792	*893,030*	*2.09*	234,579,493	238,371,114	*3,791,621*	*1.59*
Total car-miles	882,894,128	884,186,655	*1,292,527*	*0.15*	[4]42,795,852	[4]43,697,503	*901,651*	*2.06*	236,914,885	240,478,744	*3,563,859*	*1.48*
Revenue passengers	5,379,592,986	5,473,451,737	*93,858,751*	*1.71*	[5]46,786,349	[5]48,374,703	*1,588,354*	*3.28*	936,293,496	972,329,393	*36,035,897*	*3.71*
Transfer pass., revenue	[1]291,708,767	[1]294,570,149	*2,861,382*	*0.97*	[6]75,413	[6]88,007	*12,594*	*14.31*	[9]15,049,959	[9]16,280,553	*1,230,594*	*7.56*
Transfer pass., free	[2]1,400,506,277	[2]1,392,916,545	7,589,732	0.54	[7]543,268	[7]614,015	*70,747*	*11.52*	[10]131,982,125	[10]134,540,399	*2,558,274*	*1.90*
Total passengers	7,105,415,797	7,196,531,465	*91,115,668*	*1.27*	48,345,886	50,039,791	*1,693,905*	*3.39*	[10]1,099,629,885	1,138,892,818	*39,262,933*	*3.45*
Passenger revenue	$384,263,969	$382,238,538	$2,025,431	0.53	$12,723,590	$13,224,846	*$501,256*	*3.79*	$85,340,572	$88,427,422	*$3,086,850*	*3.49*
Passenger car-hours	[3]83,602,721	[3]84,572,206	*969,485*	*1.15*	[8]1,384,670	[8]1,472,849	*88,179*	*5.99*	[11]17,755,746	[11]18,186,014	*430,268*	*2.37*
Revenue car-hours	[3]83,704,246	[3]84,716,371	*1,012,125*	*1.19*	[8]2,025,789	[8]2,215,532	*189,743*	*8.56*	[11]18,224,436	[11]18,619,740	*395,304*	*2.12*
Total car-hours	[3]84,092,953	[3]85,138,783	*1,045,830*	*1.23*	[8]2,053,390	[8]2,244,486	*191,096*	*8.51*	[11]18,365,550	[11]18,742,089	*376,539*	*2.01*
Miles, single track	10,852.20	10,971.05	*118.85*	*1.08*	2,196.45	2,209.66	*13.21*	*0.60*	7,206.80	7,255.55	*48.75*	*0.67*
Passenger cars operated	[12]19,372	19,693	*321*	*1.63*	[13]457	[13]463	*6*	*1.30*	[14]4,472	[14]5,518	*46*	*1.02*

*Decreases are indicated by *italic figures.*

[1]Reported by 20 companies.
[2]Reported by 90 companies.
[3]Reported by 107 companies.
[4]Reported by 32 companies.
[5]Reported by 33 companies.
[6]Reported by 2 companies.
[7]Reported by 8 companies.
[8]Reported by 24 companies.
[9]Reported by 9 companies.
[10]Reported by 38 companies.
[11]Reported by 50 companies.
[12]Average maximum number of passenger cars in service daily. Reported by 99 companies.
[13]Average maximum number of passenger cars in service daily. Reported by 22 companies.
[14]Average maximum number of passenger cars in service daily. Reported by 43 companies.

nearly representative of the industry as a whole than those including the 286 companies.

The total operating revenues of the larger group, as shown in Table II, were $763,447,190 last year, and 0.26 per cent above 1928, while the smaller group took in $515,915,879, a decrease of 0.23 per cent. The smaller decrease in the operating expenses of the larger group shown in Table II, 0.43 per cent, as compared with a decrease of 1.63 per cent for the smaller group in Table IV, is accounted for largely by the inclusion of depreciation in the former, while it has been taken out of the latter. As shown in Table IV, the amounts charged off last year were 4.26 per cent greater than in the year previous. To make the results comparable, all depreciation was taken out of operating expenses and added to that appropriated from net income. In Table II the depreciation is shown as it was charged in the original reports.

There was a decrease of 0.58 per cent in the number of passengers carried by the companies grouped in Table II, while car-miles increased 0.26 per cent. The smaller groups of Table IV operated 0.49 per cent less car-miles and carried 1.58 per cent fewer passengers than in 1928. In both groups, however, the proportionate amount of service rendered with respect to the traffic increased last year.

Of the 286 companies included in Table II, 165 carried on auxiliary bus operations. The operating revenue from this source increased 18.28 per cent from the previous year, while the net operating revenue increased 56.60 per cent. Not all this increase was due to a mere extension of service. Despite continued expansion of their bus service in 1929 these companies were able to increase the margin between operating expenses and revenues, as is shown by the drop in the operating ratio from 94.94 to 93.30 per cent. The number of bus passengers increased 16.04 per cent, while the service in bus-miles only went up 15.10 per cent.

More detailed analysis of the 202 companies is made in the succeeding tables. When the combined figures are broken down into separate statements for city companies, interurban companies, and those operating both city and interurban lines it at once becomes apparent that the city companies made by far the best showing. They not only contributed all the surplus shown in the combined statement, but more than

Table XI—Income Statements of All Three Types of Companies in Cents per Car-Mile

	City Lines 114 Companies			Interurban Lines 32 Companies[1]			Combination Lines 54 Companies		
	1929	1928	Increase or *Decrease* Per Cent*	1929	1928	Increase or *Decrease* Per Cent*	1929	1928	Increase or *Decrease* Per Cent*
Railway operating revenue	44.70	44.43	0.61	45.23	45.24	*0.02*	42.88	43.32	*1.02*
Railway operating expenses (excl. depreciation)	30.18	30.49	*1.02*	34.52	35.15	*1.79*	31.44	31.89	*1.41*
Net operating revenue	14.52	13.94	4.16	10.71	10.09	6.14	11.44	11.43	0.09
Net revenue, auxiliary operations	0.06	0.06	.....	0.68	0.33	106.06	0.35	0.34	2.94
Taxes	2.83	2.84	*0.35*	2.39	2.27	5.29	2.29	2.39	*4.18*
Operating income	11.75	11.16	5.29	9.00	8.15	10.43	9.50	9.38	1.28
Non-operating income	0.75	0.79	*5.06*	0.69	0.78	*11.54*	1.16	1.03	12.62
Gross income	12.50	11.95	4.60	9.69	8.93	8.51	10.66	10.41	2.40
Deductions from gross income	6.97	7.00	*0.43*	12.57	13.05	*3.68*	7.01	7.03	*0.28*
Net income (before depreciation)	5.53	4.95	11.72	—2.88	—4.12	......	3.65	3.38	7.99
Depreciation	2.69	2.57	4.67	2.65	2.44	8.61	2.99	2.85	4.91

*Decreases are indicated by *italic figures*. Minus sign indicates deficit.

[1] Two of the 34 companies included in Table VIII did not report car-miles operated.

Table XII—Operating Expenses in Cents per Car-Mile

	City Lines 114 Companies			Interurban Lines 32 Companies[3]			Combination Lines 54 Companies		
Expenses	1929	1928	Increase or *Decrease* Per Cent*	1929	1928	Increase or *Decrease* Per Cent*	1929	1928	Increase or *Decrease* Per Cent*
Way and structures, excluding depreciation	3.13	31.4	*0.32*	5.46	5.51	*0.91*	4.61	4.78	*3.56*
Equipment, excluding depreciation	3.35	3.49	*4.01*	2.97	3.26	*8.90*	3.28	3.26	0.61
Power, excluding depreciation	4.03	4.00	0.75	5.17	5.42	*4.61*	4.54	4.61	*1.52*
Conducting transportation	14.93	15.07	*0.93*	11.98	11.98	......	12.79	13.13	*2.59*
Traffic	0.12	0.12	.....	0.88	0.82	7.32	0.38	0.38	.....
General and miscellaneous	4.62	4.67	*1.07*	8.16	8.28	*1.45*	5.86	5.76	1.74
Transportation for investment—credit	—0.02	—0.01	100.00	—0.10	—0.12	*16.67*	—0.03	—0.04	*25.00*
Total operating expenses, excluding depreciation	30.18[1]	30.49[2]	*1.02*	34.52	35.15	*1.79*	31.44[2]	31.89[2]	*1.41*
Depreciation									
Way and structures	0.70	0.81	*13.58*	0.77	0.75	2.67	1.04	0.99	5.05
Equipment	0.69	0.60	15.00	1.39	1.17	18.80	1.13	1.07	5.61
Power	0.12	0.13	*7.69*	0.05	0.08	*37.50*	0.37	0.36	2.78
Undistributed depreciation reported in operating expenses	0.36	0.24	50.00	.....	.....	......	....	.....	.....
Total depreciation reported in operating expenses	1.87	1.78	5.06	2.21	2.00	10.50	2.54	2.42	4.96
Depreciation reported as a deduction from net income	0.82	0.79	3.80	0.44	0.44	......	0.45	0.43	4.65
Total depreciation	2.69	2.57	4.67	2.65	2.44	8.61	2.99	2.85	4.91

*Decreases are indicated by *italic figures*. Minus sign indicates deficit.

[1] Includes 0.02 cents undistributed expense.

[2] Includes 0.01 cent undistributed expense.

[3] Two of the 34 companies included in Table IX did not report car-miles operated.

Table XIII—Significant Ratios Derived from Tables VIII-X

	City Lines, 114 Companies		Increase or *Decrease,* Per Cent*	Interurban Lines, 34 Companies		Increase or *Decrease,* Per Cent*	Combination Lines, 54 Companies		Increase or *Decrease,* Per Cent*
	1929	1928		1929	1928		1929	1928	
Railway operating revenue									
Per mile of single track	$36,370	$35,810	1.56	$8,937	$9,072	*1.49*	$14,096	$14,360	*1.84*
Gross income									
Per mile of single track	$10,172	$9,633	5.60	$1,917	$1,801	6.44	$3,507	$3,449	1.68
Passenger revenue									
Per revenue passenger, cents	7.14	6.98	2.29	[5]23.31	[5]23.59	*1.19*	9.11	9.09	0.22
Per total passenger, cents	5.41	5.31	1.88	[5]22.56	[5]22.81	*1.10*	7.76	7.76	....
Per mile of single track	$35,409	$34,841	1.63[7]	$5,793	$5,985	*3.21*	$11,842	$12,188	*2.84*
Per passenger car-mile, cents	43.77	43.50	0.62	[6]39.31	[6]38.68	1.63	39.92	40.75	*2.04*
Per car operated	[1]$15,886	[1]$15,631	1.63	[7]$24,762	[7]$25,260	*1.97*	[14]$16,936	[14]$17,347	*2.37*
Per passenger car-hour	[2]$4.11	[2]$4.05	1.48	[8]$6.06	[8]$6.11	*0.82*	[15]$3.79	[15]$3.87	*2.07*
Revenue passengers									
Per mile of single track	495,715	498,900	*0.64*	[5]22,284	[5]22,939	*2.86*	129,918	134,016	*3.06*
Per passenger car-mile	6.13	6.23	*1.61*	[9]1.68	[9]1.64	2.44	4.38	4.46	*1.79*
Per car operated	[1]213,989	[1]214,012	*0.01*	[7]87,657	[7]87,023	0.73	[14]184,158	[14]189,448	*2.79*
Per passenger car-hour	[2]60	[2]59	1.69	[10]36	[10]35	2.86	[15]46	[15]47	*2.13*
Total passengers									
Per mile of single track	654,744	655,956	*0.18*	[5]23,027	[5]24,786	*7.10*	152,582	156,973	*2.80*
Per passenger car-mile	8.09	8.19	*1.22*	[9]1.74	[9]1.69	2.96	5.14	5.23	*1.72*
Ratio, transfer passengers to revenue passengers, per cent	[3]33.02	[3]32.41	1.88	[11]5.08	[11]5.53	*8.14*	[14]18.47	[14]18.33	0.76
Revenue car miles									
Per mile of single track	81,025	80,243	0.97	[6]19,723	[6]19,925	*1.01*	32,550	32,855	*0.93*
Per car operated	[1]37,027	[1]36,183	2.33	[12]92,633	[12]93,115	*0.52*	[14]46,666	[14]46,893	*0.48*
Per car-hour	[2]9.28	[2]9.18	1.09	[8]12.53	[8]12.29	1.95	[15]10.03	[15]10.01	0.20
Revenue car-hours per car operated	[4]3,919	[4]3,925	*0.15*	[13]5,739	[13]6,045	*5.06*	[16]4,418	[16]4,389	0.66

*Decreases are indicated by *italic figures*.

[1] Reported by 99 companies.
[2] Reported by 107 companies.
[3] Reported by 96 companies.
[4] Reported by 93 companies.
[5] Reported by 33 companies.
[6] Reported by 32 companies.
[7] Reported by 22 companies.
[8] Reported by 24 companies.
[9] Reported by 31 companies.
[10] Reported by 23 companies.
[11] Reported by 8 companies.
[12] Reported by 21 companies.
[13] Reported by 19 companies.
[14] Reported by 43 companies.
[15] Reported by 50 companies.
[16] Reported by 39 companies.

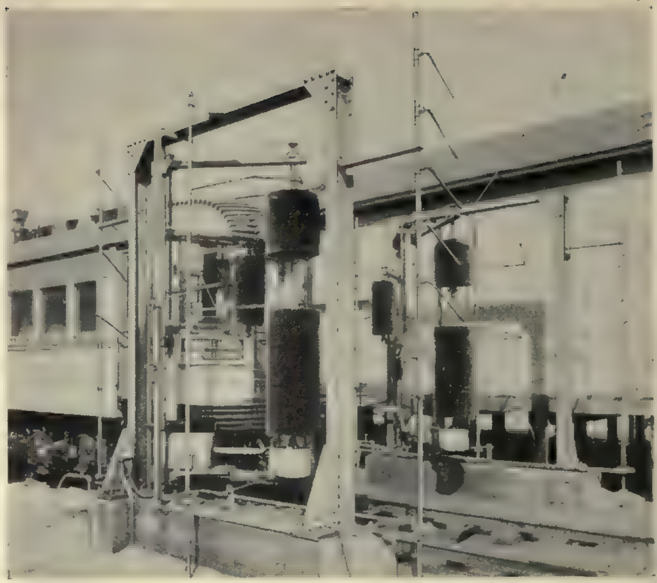
overcame the deficits of the other two groups. However, the deficits of the interurban and combination groups were substantially lower than in 1928, so that these companies contributed their share of the larger increase of 401 per cent in the combined surplus of the three groups.

Since the volume of city operations was so great that they completely outweighed those of the other two groups, it is to them that we must look for the trends which established the character of the results attained by the industry in 1929. Probably the most interesting thing brought out by the analysis of the city company results was the methods by which operating expenses were reduced. This was the largest single factor in producing the increase in net earnings. The principal source of the lower operating expenses was the increase in the average speed, despite the increasing congestion on the city streets. As shown in Table XIII, the average speed of the city companies increased from 9.18 m.p.h. in 1928 to 9.28 m.p.h. in 1929. The effect of this was that the car-hours were reduced 1.19 per cent while the car-miles were reduced only 0.12 per cent. In Table IX it is seen that the cost of conducting transportation, of which the principal factor is wages of trainmen, was reduced 1.09 per cent. The difference between this figure and the per cent reduction in car-hours is due to the higher average wages in 1929.

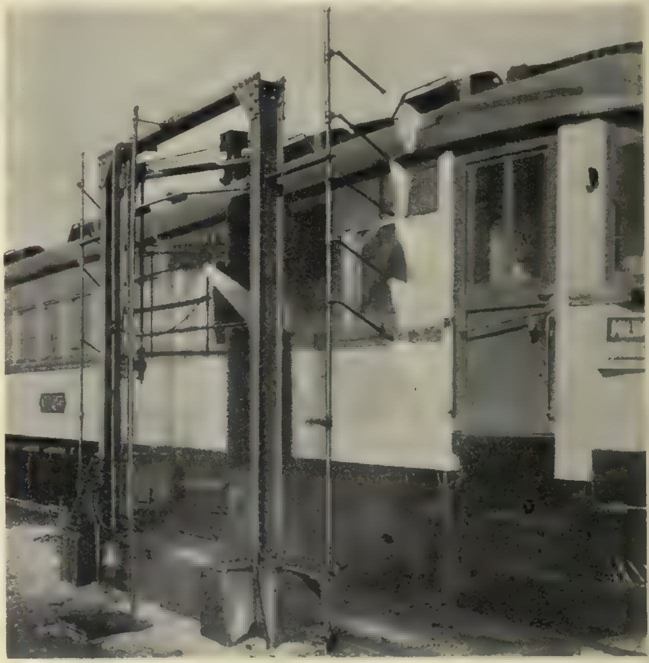
While the total passenger revenue of the city companies increased only 0.53 per cent, the passenger revenue per mile of single track increased 1.63 per cent, as is indicated in Table XIII. This is the result of abandonment of unprofitable track. It is probable that only a small proportion of these companies abandoned any track. If, then, the effect of these abandonments is sufficient to affect the average for the whole group it is reasonable to conclude that the effect on the individual companies concerned must have been much more favorable. The industry undoubtedly has many more miles of track which are no longer contributing adequately to the success of the system. As this mileage is gradually weeded out, with or without the substitution of bus service, the effect on the earning power of the balance of the trackage cannot be other than healthful and salutary.

Car Washing Speed Doubled

ROTATING vertical brushes and a high-pressure spray are the essential features of a new car-washing device designed by Henry Cordell, master mechanic, Chicago, North Shore & Milwaukee Railroad. The brushes are so arranged that a car passes slowly between them while they are rotating at a speed of 200 r.p.m. Irregularities in width or height of cars are compensated for by vertical or lateral adjustments. The spray of water reaches the car at a pressure of 350 lb. One spray is located ahead of the rotating brushes, another between them and the third behind the brushes. A single passage through the washing machine is sufficient for a thorough cleaning. Both sides of the car are washed simultaneously in approximately four minutes. The ends of the car are washed by hand, the entire operation on one car requiring about ten minutes. During an eight-hour day, 48 cars can be washed by a crew of three men, including a motorman to pilot the cars through the washer and return them to the storage tracks. The best speed obtained by the old hand method of washing cars with fountain brushes was one car an hour per man. The new method has doubled the output of clean cars per man per day. In addition to this economy in operation, the new machine does a much more satisfactory job. Approximately 50 gal. of water are used in washing each car.



These high-speed rotating brushes can be adjusted laterally and vertically



Both sides of a car are washed simultaneously in approximately four minutes by this machine used by the North Shore Line

Empty Taxis Add to Traffic Congestion

TRAFFIC counts recently made on Fifth Avenue, New York City, showed that 51 per cent of all vehicles using that street were taxicabs. One third of the taxis, or 17 per cent of the total number of vehicles, were empty. It is noteworthy that this condition exists in spite of the endeavor of the Police Department to divert empty taxis to streets other than Fifth Avenue.

Investigation has brought to light many opportunities for savings by the adoption of simplified practice. Electric railways have been active in this movement but much remains to be done.

Underground Overhead

By

GEORGE A. COOPER

Division of Simplified Practice, Bureau of Standards
United States Department of Commerce

In order to maintain the noble beauty of Washington, much of our overhead is underground.

THIS message appears on car cards displayed by one of the electric railways in Washington, D. C. It reminds the public that underground construction and maintenance is much more costly than overhead construction. Similarly, management has learned that overhead expenses are sometimes "underground." Real progress in bringing these "underground" expenses to light can be made by getting at the facts, carefully analyzing and focusing attention intensively on them. One fundamental principle which has been applied successfully in bringing many "underground" expenses to the surface is simplified practice. The managements of 105 specific industries have done this on a national scale, and it is probable that executives of thousands of organizations have applied simplification to their businesses on a purely inter-organization basis.

We make progress in spite of waste and not, as some suppose, because of it. Just because past wastes are "water over the dam" is no reason why present and future wastes should continue. The gears of progress are feeling the increasing friction of competition and management must keep them oiled. One of the best ingredients for this oil is simplification. What it has done for 105 specific industries is a criterion of what it can do for the electric railways, when put into further practice.

Simplified practice, intelligently applied, often means ready sources of supply, low inventories, interchangeability of equipment and parts, more highly skilled workmen and better service to the user or ultimate consumer. All these benefits could be translated into "good will" of the public served.

The statement comes from one public utility in New York that thousands of dollars are being saved annually through the simplification of cables. An engineer of a Pennsylvania utility writes an article appearing in a recent issue of the *Electrical World* which says that his company is profiting in many ways through the simplification of materials and designs used in substation construction. The Division of Simplified Practice received a letter recently from the purchasing agent of a large utility in Michigan explaining how simplified practice recommendations were being used to advantage by his company and how every recommendation was thoroughly investigated by a standardization committee before being approved. This company has accepted 33 simplified practice recommendations. The simplification and standardization committee of an electric railway, also operating a large number of buses in West Virginia, has been termed the "flying squadron" because of the speed with which it dispatches its meetings and follows through with its recommendations. This committee visits every stockroom on the system and every member "must be shown" before any elimina-

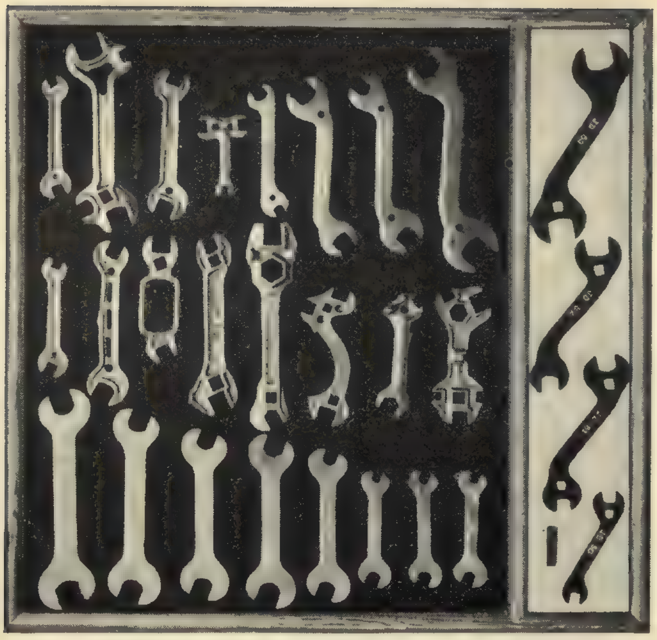
Simplification of Materials and Supplies by a Public Utility Company

STEPS TAKEN

Standardization committee appointed.
Standardization meetings held monthly.
Standard stock catalog issued.
Record of standard specifications developed by each department.
One standard only for similar material used by several departments.
New standards permitted only on approval of standardization committee.
Special material carried "as special" and followed closely.
Mottoes pertaining to standardization used on intercompany memoranda to stimulate interest.
Standard specifications and standard tests adopted.
Slow moving and overstocked items circularized among affiliated companies.

RESULTS

			Per Cent
Reduced inventory investment	**from**	**$800,000 to $328,000**	**59**
Reduced inventory items	**from**	**8,000 to 3,120**	**61**
Reduced labor	**from**	**33 to 23**	**30**
Reduced space			**50**
Improved service			**50**



Wrenches—before and after simplification

tions of, or additions to, standards are made. The efforts of this committee have resulted in a reduction of better than 33 per cent.

Simplification is one of the tools of modern management by which much of our present-day waste can be eliminated. If track gages were different at different locations on the same system, think of the confusion which would result. If the car windows are of different sizes, think of the varieties of glass that must be carried in stock or cut from other sizes with resulting losses. Wastes exist in varying degrees. What about the repair and quick replacement of motor parts and controller parts, not to mention the hundreds of other parts which do break down or wear out? Even a retriever or headlight part can cause all kinds of annoyance and often delay service. It is well to keep these parts in stock, but with a variety of types of equipment, it means more stock clerks, more storage space, more purchasing personnel, more highly skilled mechanics, higher inventories, slower turnover and, sad but too true, inadequate service.

A committee of the American Electric Railway Association has made a number of significant recommendations on this subject.

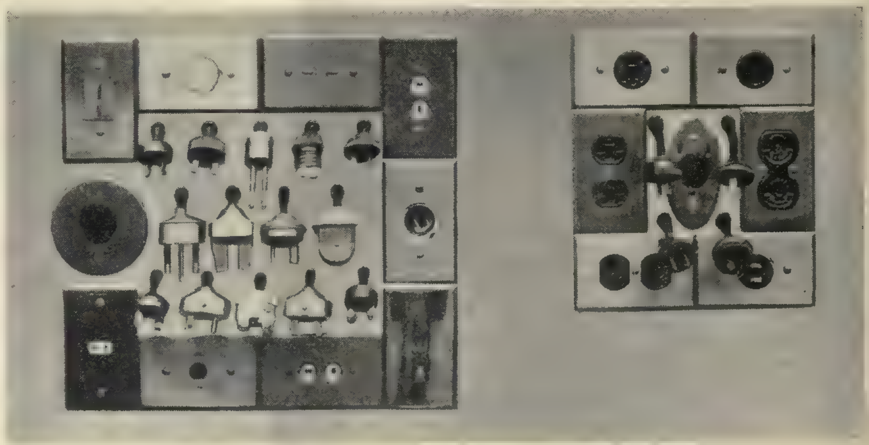
1. Each company should establish its own simplification and standardization committee.
2. The members of this committee should be appointed by the executive head of the company.
3. The members of this committee should represent the departments interested.
4. The chairman of this committee should be the executive head of the stores department.
5. Each member of this committee should be vested with final authority as to the simplification and standardization of stock and the disposition of surplus and obsolete material within his department; other members' opinions should be carefully considered.
6. The chairman of the committee should call meetings and invite those members who, in his judgment, are interested in the materials to be studied.
7. The executive head of the company should make it mandatory for each member so invited to attend these meetings.
8. It should be optional with any member of the committee representing a department of the company to ask any assistants that he may deem necessary to attend the meeting with him.
9. The committee should discuss and review each class of stock periodically at the discretion of the chairman.
10. Minutes in detail should be kept of each meeting and a copy of these should be furnished to all members of the committee and others interested; the minutes should show the action taken by the committee as to the findings in regard to each of the various items, in order that the recommendations of the committee may be complied with throughout the departments concerned.
11. It is further recommended that the chairman of this committee keep in close touch with the work of, and co-operate with, the Division of Simplified Practice of the United States Department of Commerce. Many simplifications already proposed and accepted by industry and endorsed by the Department of Commerce include materials used on electric railway properties. Lists of the simplified sizes, dimensions, etc., of these materials which have been especially arranged for the convenience, use and files of foremen, storekeepers, engineers, purchasing staffs, etc., can be obtained free of charge upon request from the Division of Simplified Practice. It is believed that the concentration of purchases of materials pertinent to electric railway properties on the simplified lines already established by industry and endorsed by the Department of Commerce, whenever possible and wherever practicable, should effect benefits redounding to the advantage of electric railway properties.

One particular electric railway has effected a considerable saving through following just such a program. Minutes of some of the interdepartment meetings to discuss this subject bring out numerous interesting points.

1. The master mechanic is to furnish the purchasing agent with a list of paints carried in stock with a recommendation that certain kinds be returned for credit, if possible. The master mechanic is to arrive at a standard list to be carried by the storekeeper. The present list of 37 kinds is too large.
2. Four kinds of brooms are being carried. Two are enough.
3. Eighty-eight sizes of machine bolts are being carried in stock. The master mechanic and storekeeper must get together, study the requirements and reduce this list of sizes.
4. All parts for No. — compressor are only to be ordered as needed, as this type of compressor will soon be taken out of service.
5. Too many controller parts are being stocked. Certain types will soon be obsolete. Keep in touch with other divisions and order only as needed.
6. Three kinds of greases are to be used until stock is depleted and not reordered.
7. Eighty-five sizes of steel are to be studied and the purchasing agent informed by the master mechanic and storekeeper as to standard sizes to be stocked in the future.
8. A list of truck parts is to be sent the purchasing agent with a recommendation that certain items are to be returned for credit, or sold to other companies using this equipment.

Just such a specialized study, or simplified practice, if you please, resulted in a reduction in the value of stock carried, from $80,000 to $20,000 in one local storeroom on the system. Other storerooms effected comparable reductions.

Electric railways have contributed much in helping



Electric outlets and plugs—before and after simplification manufacturers effect simplified practice recommendations through their American Electric Railway Association. More than a score of recommendations for simplified practice have been accepted. These are:

No. 16—Lumber
No. 26—Steel Reinforcing Bars (Cross-sectional Areas)
No. 28—Sheet Steel
No. 35—Steel Lockers
No. 36—Milling Cutters
No. 45—Grinding Wheels
No. 47—Cut Tacks and Small Cut Nails
No. 48—Shovels, Spades and Scoops
No. 49—Sidewalk Lights
No. 53—Steel Reinforcing Spirals
No. 56—Carbon Brushes and Brush Shunts
No. 57—Wrought-Iron and Wrought-Steel Pipe, Valves, and Pipe Fittings
No. 58—Classification of Iron and Steel Scrap
No. 60—Parking of Carriage, Machine and Lag Bolts
No. 63—Metal Spools
No. 71—Turnbuckles
No. 73—One-piece Porcelain Insulators
No. 76—Ash Handles
No. 90—Hacksaw blades
No. 95—Skid Platforms
No. 100—Welded Chain

These particular recommendations should be of interest to the engineer, purchasing agent, superintendent, storekeeper and foreman of every electric railway. The management of every company should ascertain if these schedules have been investigated, or adopted and if not, why not. The Division of Simplified Practice will send complimentary sheet form copies of any recommendations upon receipt of written request.

Results of a Three-Year Simplification Campaign by a Public Utility Company

	Number of Varieties		Per Cent
	Before	After	Reduction
Iron	**75**	**49**	**35**
Insulators	**13**	**7**	**46**
Bolts	**138**	**70**	**49**
Paints	**24**	**12**	**50**
Alley arms	**3**	**1**	**66**
Meters and transformers	**Standard sizes established Many items eliminated.**		

RESULTS

1. Items reduced 16 per cent.

2. Inventories reduced $182,000, or 36 per cent.

3. Inventory discrepancies reduced from 1.9 to 0.4 per cent.

4. Expenses reduced 36 per cent.

5. Turnover increased 100 per cent.

Bernard J. Yungbluth, president of the International Railway Company of Buffalo, N. Y., has said:

> . . . Every dollar's worth of obsolete or scrap material turned into cash, every dollar's worth of excess supply returned for re-issue, every dollar's worth of purchases postponed until actually needed, is a dollar added to the cash box, just as valuable as though obtained through the sale of our product.

If the little-called-for varieties of supplies and equipment used by electric railways could be eliminated in manufacture through the co-operation of the electric railways and manufacturers, would not the money saved be money in the cash box?

The simplified invoice form has been successfully promulgated because representative users had the vision to see what it would mean for industry. The department stores are now sponsoring a survey of methods and supplies used in wrapping and packing merchandise for transmission to the customer. When the survey is completed and the resulting recommendations put into effect, it will mean a savings of millions of dollars to department stores. Many electric light and power companies are now urging a simplification of pole line hardware because they realize the benefits inherent in such a program. Users of paper are responsible for studies now being made which should ultimately lead to simplification and standardization.

What is to prevent an organized co-operative effort on the part of the electric railway industry to extend the scope of its present studies and come forward with requests that lines of materials and equipment be simplified which are purchased chiefly by them? After all, regardless of wastes in manufacture and distribution, the consumer pays the bill and the electric railways are very large consumers.

To the manufacturer, simplified practice means:

1. Less capital tied up in raw materials, semi-finished stock, storage space and repair parts.
2. More economical manufacture through larger units of production, reduced variety of manufacturing units, larger runs, less frequent changes, higher rates of individual production, accurate and proper estimating for production, more effective stock control.
3. Better and simplified inspection, less idle equipment, reduced amount of equipment, greater ease in securing raw materials and conserving raw products, and cheaper handling of stocks.
4. Reduced clerical overhead, standardized material inventories, more efficient labor due to making simpler the training of employees.
5. Better earnings, through increased individual production, made possible by longer runs, improved morale, skill increased by repetitive process, less labor idle from preventable causes, more permanent employment as contrasted to present seasonal employment, less difficulty in getting help.
6. Better service to the trade in better quality of product, more prompt delivery, decreased quantity of sizes of packing required, fewer packages broken in transit, less chance of errors in shipment, less obsolete material, more efficient sales force, increased rate of turnover, intensified sales momentum, easier financing, fewer factory shutdowns, the focusing of attention on individuality in those features where there should be individuality, discouragement of attempts to apply it to those features where it is superficial and useless, and where standardization and quality should prevail, easier plans and schedules, and decrease in number of production processes.

To the distributor, the adherence to simplified practice will mean:

1. Increased rate of turnover due to all live numbers.
2. Elimination of slow-moving stock, staple line, easy to buy and quick to sell, more effective sales force, greater concentration of sales on fewer items and standard patterns that are proved best sellers.
3. Decreased capital investment in stock on hand, repair parts on hand, storage space required, less stock depreciation and obsolescence, decreased overhead on handling charges, clerical work, better service through lower prices, quicker and more reliable deliveries.

Gains to the ultimate consumer through simplified practice are:

1. Better prices than would otherwise be possible.
2. Better quality of product through ability of manufacture to concentrate on better design and through the reduction of manufacturing expenses.
3. Better service and prompter delivery of new equipment, replacements and repair parts.

A.E.R.A. Announces Progran

PLANS for the annual convention of the American Electric Railway Association and its affiliated organizations are now virtually complete. The sessions will be held at the Fairmont Hotel, San Francisco, beginning Monday morning, June 23, and continuing to Thursday noon, June 26. The sessions of the American Association will be held Monday, Tuesday and Wednesday mornings, and the affiliated associations will meet in the afternoons of Monday and Wednesday. The Engineering Association and the Transportation and Traffic Association also will have sessions on Thursday morning. Luncheon meetings of the various associations will be held on Monday, Tuesday and Thursday.

The Advisory Council program this year will consist of a banquet to be held Monday evening. It will be preceded by a reception. At this meeting the award of the Charles A. Coffin prizes will be made.

Following are the programs, as corrected up to May 22.

American Association

General Theme—1930's Challenge to Transportation Men

Monday, June 23, 10 a.m.

GOLD BALLROOM,
FAIRMONT HOTEL, LOBBY FLOOR

Subject of the Day—"The Future of an Indispensable Service Is at Stake"

Welcome, by Honorable James Rolph, Jr., Mayor of San Francisco, Cal.

Address of the President—Paul Shoup, chairman of the board Pacific Electric Railway, San Francisco.

"Revenue Prospects of Electric Interurban Transportation," by D. W. Pontius, president Pacific Electric Railway, Los Angeles, Cal.

"Making the Most of Existing Street Railway Properties," by Samuel Kahn, president Market Street Railway, San Francisco, Cal.

Report of Managing Director Charles Gordon, American Electric Railway Association, New York, N. Y.

Luncheon—San Francisco Electrical Development League

PALACE HOTEL, 12 m.

The San Francisco Electrical Development League has extended a cordial invitation to delegates to attend this luncheon, at which there will be brief addresses by prominent electric railway executives.

Advisory Council Banquet

PALM COURT AND ROSE ROOM,
PALACE HOTEL

RECEPTION 6:30 P.M. DINNER 7 P.M.
Report of Advisory Council.
Toastmaster—President Paul Shoup.
Presentation—Charles A. Coffin Foundation Award.
Address by nationally prominent speaker.

Tuesday, June 4, 10 a.m.

GOLD BALLROOM,
FAIRMONT HOTEL, LOBBY FLOOR

Subject of the Day—"The Industry's Effort to Help"

Presentation—Anthony N. Brady Safety Award by President Paul Shoup.

Report—Committee on Nominations—James P. Barnes, president Louisville Railway, chairman.
Election of Officers.

"Street Traffic Economics," by G. A. Richardson, vice-president and general manager Chicago Surface Lines, Chicago, Ill.

"Progress in Meeting the Industry's Equipment Problem," by Dr. Thomas Conway, Jr., president Cincinnati & Lake Erie Railroad, Philadelphia, Pa.

"The Man on the Platform—Our Greatest Potential Asset," by J. N. Shannahan, president Omaha & Council Bluffs Street Railway, Omaha, Neb.

"Conference Training—Its Technique and Possibilities," by Edward Dana, general manager Boston Elevated Railway, Boston, Mass.

Informal Round Table Luncheon Conferences—12:45 p.m.

FAIRMONT HOTEL

No. 1—Relief of Traffic Congestion—G. A. Richardson, *sponsor*.

No. 2—Fare Structures—A. S. Richey, *sponsor*.

No. 3—Transportation Problems of the Small City—F. L. Butler, *sponsor*.

No. 4—Interurban Management and Operation—D. W. Pontius, *sponsor*.

No. 5—Employee Relations and Trainmen's Conference Demonstration*—Edward Dana, *sponsor*.

No. 6—Development of Cars and Car Equipment — Dr. Thomas Conway, Jr. *sponsor*.

No. 7—Development of Buses and Trolley Buses—Edward A. West, *sponsor*.

No. 8—The Taxicab as a Factor in Community Transportation—J. B. Stewart, Jr., *sponsor*.

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*The Trainmen's Conference Demonstration will be given by the employees of the Market Street Railway under the leadership of T. A. Bragg. "Interesting the Customer" is the subject which has been selected for this demonstration.

f San Francisco Convention

Wednesday, June 25, 10 a.m.

Gold Ballroom,

Fairmont Hotel, Lobby Floor

Subject of the Day—"The Public Holds Control"

Award—Electric Traction Speed Contest—T. Fitzgerald, vice-president Pittsburgh Railways, chairman.

"Transportation — A Community Problem," by H. G. Taylor, manager public relations, car service division American Railway Association, Washington, D. C.

"Public Responsibility in Regulating a Competitive Industry," by John E. Curtiss, chairman State Railway Commission, Lincoln, Neb.

"Taxation," by M. D. Lack, tax counselor California Taxpayers' Association, Los Angeles, Cal.

"Our Contact with the U. S. Chamber of Commerce," by J. N. Shannahan, president Omaha & Council Bluffs Street Railway, Omaha, Neb., national councilor.

"National Relations," by C. D. Cass, general counsel American Electric Railway Association, Washington, D. C.

Official Business.

Installation of Officers.

General Luncheon Conference

Thursday, June 26, 12:45 p.m.

Fairmont Hotel

Franklin T. Griffith, Chairman

As a fitting climax to the convention, this general luncheon conference has been arranged for all delegates and guests. The discussion will summarize the high spots of the convention and the status of the industry.

Adjournment.

Accountants' Association

Monday, June 23, 2 p.m.

Florentine Room, Fairmont Hotel, Lobby Floor

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Report—Committee on Standard Classication of Accounts—M. W. Glover, general auditor West Penn Railways, Pittsburgh, Pa., chairman.

Discussion.

Report—Subcommittee on Bus Accounting—E. A. Tuson, general auditor Public Service Coordinated Transport, Newark, N. J., chairman.

Discussion.

"The Capital Structure of Public Utilities," by John F. Forbes, resident partner Haskins & Sells, San Francisco, Cal.

Discussion.

Report—Committee on Nominations—T. P. Kilfoyle, auditor Cleveland Railway, chairman.

Election of Officers.

Tuesday, June 24, 12:45 p.m.

Luncheon Meeting, Mark Hopkins Hotel

Informal gathering of accountants and railway men interested in accounting subjects. Luncheon will be followed by a discussion of accounting problems.

Wednesday, June 25, 2 p.m.

Florentine Room,
Fairmont Hotel, Lobby Floor

"The Auditor—Figurer or Analyst," by Leslie Vickers, economist American Electric Railway Association, New York, N. Y.

Discussion.

Report—Committee on Budgetary Control—R. Gilman Smith, statistician North American Company, New York, N. Y., chairman.

Discussion.

Report—Committee on Resolutions—J. E. Heberle, assistant to the president Capital Traction Company, Washington, D. C.

Installation of Officers.

Presentation of Past-President's Badge.

New Business.

Claims Association

Monday, June 23, 2 p.m.

Gray Gallery,

Fairmont Hotel, Lobby Floor

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Report—Committee on Nominations—Wallace Muir, general attorney Kentucky Traction & Terminal Company, Lexington, Ky., chairman.

Election of Officers.

Following the election of officers the meeting will be turned over to the Pacific Claim Agents' Association.

President B. F. Boynton, Chairman

"Bus Accidents—Their Causes and Prevention," by S. A. Bishop, general claim agent Pacific Electric Railway, Los Angeles.

W. R. Sherman, general claim agent Spokane, Portland & Seattle Railway, Portland, Ore.

"Methods of Impressing Employees with the Importance of Obtaining Witnesses and Gathering Material Facts," by A. E. Nicolletti, assistant claim agent Key System Transit Company, Oakland, Cal.

J. E. McClain, claim agent Austin Street Railway, Austin, Tex.

"The Value of Motion Pictures in Claims Work," by C. M. McRoberts, general claim agent Los Angeles Railway.

Tuesday, June 24, 12:45 p.m.

Luncheon Meeting, Mark Hopkins Hotel

Informal Round Table Discussion on the "Ambulance Chasing" Problem.

Wednesday, June 25, 2 p.m.

Gray Gallery,

Fairmont Hotel, Lobby Floor

Report-Committee on Uniform Negligence Law—J. S. Kubu, assistant superintendent accident dept., Cleveland Railway, chairman.

Discussion.

"Should the Company Surgeon Call on the Injured Immediately after an Accident or Wait Until Liability Is Determined," by J. A. Sweeney, assistant claims attorney Chicago South Shore & South Bend Railroad, Gary, Ind.

M. C. Chapman, Jr., attorney Key System Transit Company, Oakland, Cal.

Report—Committee on Claims Department Practices—Bert C. Wood, general claim agent Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio, chairman.

Discussion.

"Blind Accidents and How to Handle Them," by G. T. Hellmuth, claims attorney Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

J. W. Giltner, chief claim agent Northern Ohio Power & Light Company, Akron, Ohio.

Report—Committee on Safety—P. W. Klabunde, general claim agent Milwaukee Electric Railway & Light Company, Milwaukee, Wis., chairman.

Discussion.

"Recent Legislation Affecting Guests of Motorists Who Are Injured in Accidents," by Earl S. Nelson, claims attorney Pacific Northwest Public Service Company, Portland, Ore.

Arthur L. Levinsky, attorney Stockton Electric Railway, Stockton, Cal.

Installation of Officers.

Presentation of Past-President's Badge.

Engineering Association

Provision will be made for discussion after each address or group of committee reports.

Monday, June 23, 2 p.m.

RED ROOM, FAIRMONT HOTEL, LOBBY FLOOR

Engineering Day

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

"Electric Railway Special Trackwork," by B. P. Legaré, engineer maintenance of way and construction Market Street Railway, San Francisco, Cal.

"The Relations of Purchasing and Engineering," by Frank M. Harris, chief of bureau of specifications and estimates, department of engineering, Pacific Gas & Electric Company, San Francisco, Cal.

"The Engineer and His Valued Influence in Western Developments," by A. T. De Forest, vice-president United States Steel Products Company, San Francisco, Cal.

"London Omnibuses and Other Forms of Passenger Transportation," by George J. Shave, operating manager and chief engineer London General Omnibus Company, London, England.

"Economies of the High-Speed Street-Car Motor and Drive," by C. Bethel, manager railway motor engineering department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Wednesday, June 25, 2 p.m.

RED ROOM, FAIRMONT HOTEL, LOBBY FLOOR

Report—Standing Committee on Rolling Stock—T. H. Nicholl, chairman.

Reports of Rolling Stock Committees:

No. 1—Manual Review—W. C. Bolt, chairman.

No. 2—Motor Coaches—P. V. C. See, chairman.

No. 3—Car Design—H. H. Adams, chairman.

No. 4—Lighting—R. W. Cost, chairman.

No. 6—Lubrication—J. H. Lucas, chairman.

Report—Heavy Electric Traction Committee—L. C. Winship, chairman.

Report—Standing Committee on Power—W. E. Bryan, chairman.

Reports of Power Committees:

No. 1—Manual Review—J. Walter Allen, chairman.

No. 2—Mercury Power Rectifiers—N. W. Codding, chairman.

No. 3—Power Contracts—Ralph H. Rice, chairman.

No. 4—Power Supply for General Purposes—J. F. Neild, chairman.

No. 5—Catenary Specifications—Dwight L. Smith, chairman.

No. 6—Trolley Wire Wear—H. S. Murphy, chairman.

"Engineering Challenges of the West," By Lester S. Ready, consulting engineer, San Francisco, Cal.

Report—Standing Committee on Way and Structures—C. A. Smith, chairman.

Reports of Way and Structures Committees:

No. 1—Manual Review—W. R. Dunham, Jr., chairman.

No. 2—Special Trackwork—E. M. T. Ryder, chairman.

No. 3—Weed Elimination—J. I. Catherman, chairman.

No. 4—Wheel and Rail Contours—P. J. Mitten, chairman.

No. 5—Wood Preservation—C. A. Smith, chairman.

No. 6—Arc Welding—Chester F. Gailor, chairman.

No. 7—Alloy Steels for Special Trackwork—P. A. Kerwin, chairman.

Report—Standing Committee on Purchases and Stores—A. L. Pischer, chairman.

Reports of Purchases and Stores Committees:

No. 1—Manual Review—J. Fleming, chairman.

No. 2—Unit Piling and Standard Packages—W. E. Scott, chairman.

No. 3—Stores Investment and Costs—W. S. Stackpole, chairman.

Thursday, June 26, 10 a.m.

RED ROOM, FAIRMONT HOTEL, LOBBY FLOOR

Report—Committee on Co-operation with U. S. Department of Commerce—E. P. Goucher, engineer of way and structures Capital Traction Company, Washington, D. C., chairman.

Reports of Purchases and Stores Committees:

No. 4—Pricing Methods and Records—A. A. Ordway, chairman.

No. 5—Standardization and Simplification of Stock—C. A. Harris, chairman.

No. 6—Material and Supplies Control—E. F. Kelley, chairman.

"Elimination of Waste," by A. S. Duncan, assistant director of finished stocks Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Reports of Way and Structures Committees:

No. 8—Pavement—S. Clay Baker, chairman.

No. 9—Motor Bus Garage Design—Morse W. Rew, chairman.

No. 11—Track Construction—C. L. Hawkins, chairman.

No. 12—Rail Corrugation—H. S. Williams, chairman.

No. 14—Rails—C. A. Alden, chairman.

No. 15—Track Gage—C. H. Clark, chairman.

No. 16—Foundations for Special Trackwork—W. A. Underwood, chairman.

Reports of Power Committees:

No. 7—Trolley Construction Specifications—L. R. Wagner, chairman.

No. 10—Lightning Protection—A. Schlesinger, chairman.

No. 11—Distribution Systems—J. Leisenring, chairman.

No. 12—Ferrous and Non-Ferrous Materials—H. F. Brown, chairman.

No. 13—Trolley Voltage Surveys—A. J. Klatte, chairman.

Reports of Rolling Stock Committees

No. 8—Fire Hazards in Shop Practices—E. J. Jonas, chairman.

No. 9—Noise Reduction—H. S. Williams chairman.

No. 11—Current Collecting Devices Hugh Savage, chairman.

No. 13—Limits of Wear—W. T. Vivian chairman.

"Modern Vehicles and Equipment for Urban Transportation," by C. A. Burleson, Transportation Engineering Department General Electric Company, Erie, Pa.

Report—Committee on Nominations—F. H. Miller, vice-president and general manager Louisville Railway, Louisville, Ky., chairman.

Election of Officers.

Installation of Officers.

Presentation of Past-President's Badge.

Transportation and Traffic Association

Monday, June 23, 2 p.m.

GOLD BALLROOM,
FAIRMONT HOTEL, LOBBY FLOOR

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Report—Committee on Nominations—W. H. Boyce, commercial manager Pittsburgh, Railways, Pittsburgh, Pa., chairman.

Election of Officers.

Other Business.

Report—Committee on the Transportation Employee—Clinton D. Smith, superintendent department of personnel Cleveland Railway, Cleveland, Ohio, chairman.

Discussion.

Report—Committee on the Movement of the Vehicle—C. W. Wilson, manager research department Pittsburgh Railways, Pittsburgh, Pa., chairman.

Discussion.

Tuesday, June 24, 12:45 p.m.

LUNCHEON MEETING, FAIRMONT HOTEL

Transportation Problems of the Small City

F. L. BUTLER, Sponsor

Wednesday, June 25, 2 p.m.

GOLD BALLROOM,
FAIRMONT HOTEL, LOBBY FLOOR

Transportation and Traffic Day

Report—Committee on Operating Economics—Joe R. Ong, director of research Cincinnati Street Railway, chairman.

Discussion.

"The Company, the Public and the Municipalities," by Hon. Edwin O. Edgerton, former president California Railroad Commission, San Francisco, Cal.

Discussion.

Thursday, June 26, 10 a.m.

GOLD BALLROOM,
FAIRMONT HOTEL, LOBBY FLOOR

Report—Committee on the Passenger—William W. Holden, chairman; manager traction department San Antonio Public Service Company, San Antonio, Tex.

Discussion.

Report—Committee on The Equipment—L. C. Datz, chief engineer St. Louis Public Service Company, chairman.

Discussion.

General Discussion.

Installation of Officers.

Presentation of Past-President's Badge.

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Entertainment

Sunday, June 22

9 a.m.—Golf at San Francisco Country Clubs.

2 p.m. and 3 p.m.—Automobile trips.

8-10 p.m.—Concerts in lobbies of principal hotels.

Monday, June 23

9-10 a.m.—Chinese Orchestral Groups, in lobby of Fairmont Hotel.

3:30-5 p.m.—Ladies' informal reception and tea, in Laurel Court, Fairmont Hotel Music by Rudy Seiger's orchestra.

6:30 p.m.—Advisory Council reception and banquet. See American program. Music by Uzia Bermoni's Palace Hotel orchestra.

Tuesday, June 24

9:30-11:30 a.m.—Shopping tours for the ladies.

2:45 p.m.—California relief map, Ferry Building, foot of Market Street.

8 p.m.-1 a.m.—"A Night in Hawaii"—Venetian Terrace and Pool Fairmont Hotel. Johnny Noble's orchestra and Hawaiian Girls' Glee Club.

Chinatown trips.

Informal dancing. Music by Anson Weeks orchestra.

Wednesday, June 25

11:30 a.m.—Automobile trip for the ladies, including luncheon at Taits-at-the-Beach and tea in the gardens of Mr. and Mrs. Paul Shoup's Los Altos estate.

9 p.m.-2 a.m.—Old California Ball, Fairmont Hotel. Music by Anson Weeks orchestra.

Thursday, June 26

No arranged programs. "Free for all."

Delegates will receive a post-convention plan form when they register giving a choice of a number of trips.

Awards Made for the Second Period of MAINTENANCE CONTEST

Ideas Submitted by Railway Men in Toronto Baltimore, Cleveland and San Diego Win Prizes

Walter McRae

Angus Scott

Charles Herms

REPRESENTATIVES of four electric railway properties were among the prize winners in the second period of ELECTRIC RAILWAY JOURNAL Maintenance Contest, ending April 30. In the department of rolling stock and shops, first prize was won by Walter McRae, superintendent of rolling stock and shops, Toronto Transportation Commission, for his special armature nut wrench. A description of this device was published in the May issue. First prize in the track department went to F. B. Habercam, superintendent of welding, United Railways & Electric Company of Baltimore. His article concerning an iron rod that acts as a dam for weld material appeared in the April issue. In the electrical and line department, the winner was Angus Scott, assistant superintendent of overhead lines, who submitted a description of warning lights on tower wagons, which is published elsewhere in this issue. The winner in the bus and garage department was Charles Herms, general superintendent and carhouse foreman, San Diego Electric Railway. The device for which this award was made was a door engine used for pressure lubrication. Description of it was published in the April issue. Both Mr. Scott and Mr. Herms were prize winners in previous periods of ELECTRIC RAILWAY JOURNAL Maintenance Contest.

WALTER R. McRAE

BORN at Bolsover, Ontario, Canada, in 1874, Walter R. McRae received his education in the public schools of Toronto. He followed this with courses in the Collegiate Institute and Technical School of that city, and also a course in electric lighting and railways in the International Correspondence Schools. His business career began with the Ball Electric Light Company and the Toronto Incandescent Light Company, but in 1892 he entered the service of the Toronto Railway under Sir William MacKenzie, being the first employee engaged in the rolling stock department of the company. Mr. McRae continued with the Toronto Railway in various capacities in the electrical and mechanical departments until 1921, when he entered the service of the Toronto Transportation Commission as superintendent of rolling stock and shops. Thus Mr. McRae has had a continuous experience in the railway mechanical field of approximately 39 years.

F. B. HABERCAM

F. B. HABERCAM is a native of Baltimore and received his early education in the public schools of that city. He supplemented this with one year in business college and a course on foremanship and management at the local Y.M.C.A. Mr. Habercam entered the service of the United Railways & Electric Company as progress clerk in 1911, and was promoted to material clerk in 1913. Since 1922 he has filled the position of superintendent of welding.

ANGUS SCOTT

FOLLOWING his graduation from the Case School of Applied Science, in 1922, Angus Scott entered the service of the Drew Electric & Manufacturing Company, of Cleveland, as salesman of railway supplies. In 1924 he became associated with the Cleveland Railway. After a varied experience in several departments he displayed a special aptitude for the overhead line work and was appointed assistant superintendent in that service. He holds that position at the present time. At the close of the second period of the ELECTRIC RAILWAY JOURNAL Maintenance Contest in 1929 Mr. Scott was awarded the prize in the electrical and line department.

CHARLES HERMS

AFTER a varied career, which included supervision of a mill for the San Antonio Portland Cement Company and the reconditioning of a telephone and electrical system for the Boston & Superior mine in Arizona, Charles Herms began his street railway career as a general repair man with the San Antonio Public Service Company in 1919. At the end of four years in this capacity he became foreman of a crew engaged in the remodeling of cars, but left San Antonio in 1923 to join the San Diego Electric Railway as general shop and carhouse foreman, a position which he holds at the present time. During the war Mr. Herms was attached to the First Army Corps in a motor repair unit. Mr. Herms has taken an active interest in ELECTRIC RAILWAY JOURNAL Maintenance Contests, and in 1929 was the winner of a first prize in the bus and garage division.

Excellent facilities for car repair and painting are provided at the Everett shops. The view shows how well lighted is the center of the building

Repairing 900 Cars a Yea

Work schedule at new Everett shop calls for completion of seventeen cars a week, including general overhauling and painting for all divisions except the Cambridge-Dorchester subway and East Boston tunnel

CAR and bus body overhauling on the Boston Elevated Railway concentrated at the New Everett shops, except for the Cambridge-Dorchester subway and East Boston tunnel cars, which are repaired at a shop designed and built for the purpose in Cambridge just beyond the Harvard Square terminal of the Cambridge subway.

In order to have a steady flow of work through the Everett body and paint shops, a definite schedule has been adopted which calls for the completion of seventeen cars each week in the paint shop. This is the maximum number which can be put through for general repairs and painting with the present number of employees. On this basis the entire plan of handling repair work at Everett is laid out.

If a car is to be kept in good condition during its life, it is believed necessary by the management to put it through the shops approximately every fifteen to eighteen months. Assuming a life of about twenty years, the average car would go through the shops from twelve to fifteen times to keep it in first-class condition. If the cars are sent through at about this rate, it is the experience in Boston that they will easily have the life of twenty years. Less frequent shopping, while it may appear to be an economy, results in more rapid deterioration of the cars. Infrequent painting, particularly, increases repairs to the cars when they do come into the shops, and while it saves expense for the time being, the charges in the long run make the cost of upkeep a great deal more owing to decay and corrosion.

The time when the individual car is sent in for repairs is, under the present procedure, determined by the carhouse foreman. With the approval of the district supervisor he is the one individual who passes on the question of when a car should be sent in to the shops for general repairs. Three factors govern the decision of the foreman: the policy of the management, the condition of the car, and accidents. While the amount of money available for maintenance determines to some extent the policy of the management with respect to general repairs, it is not possible to run a car too long without going through the shops, and failures would be too numerous. Frequently after accidents it is necessary to send cars to the Everett shop, as the collisions cause damage too great to be repaired at the carhouse.

When the carhouse foreman, with the approval of his district supervisor, has decided to send a car to the shops, he first fills out a card stating in detail the work that must be done on it. This card is attached to the car and the transportation department is notified to furnish a crew to take the car to the shops.

When the car arrives at the shops it is placed on a siding in the yard for inspection. It often is found on thorough examination that the repair work to be done is much more than that reported by the carhouse foreman. Some of the most serious defects, such as rotted sills and posts, are not apparent until some of the sheathing is stripped off and the framework of the car is exposed. After the condition of the car is ascertained, it is placed on the waiting list to go through the shops.

In order to keep the paint shop busy, it may be necessary to hold some cars requiring heavy repairs in order to let in cars which need only minor work. It also may be necessary to order special material which must be received before the work can start. Then again, the condition of the car may be so bad that the management may be requested to decide whether the car should be repaired or scrapped. So far as possible, however, cars are passed through the shops in the order in which they are received from the carhouse.

in the Boston Elevated Shop

As soon as a berth in the shop is vacant, the next car scheduled for repairs is transferred from the yard to the shop. With the completion of the work on a preceding car, the crew of men released is assigned to the new car. If the car just received has been in an accident, the necessary repairs are made, the car is retouched with paint and put back in service, unless the damage is so great that more general repairs are necessary. Cars in for general overhauling are first stripped. All the detachable parts are removed from the car body. Window screens are sent to the machine shop for repairs, after which they are transferred to the paint shop for cleaning and dipping. When repairs are needed on sash and doors they are removed and sent to the sash and door department for such repairs as are necessary and then returned for installation. The door operating mechanism is taken down and overhauled thoroughly. Seat cushions and backs are all removed, placed in special racks, sent to the seat repair department and renovated, after which they go to the paint shop for cleaning and repainting. The seat frames are likewise gone over.

After all these removable parts are taken off, the repairs to the body framing are begun. If the car is old and there are indications that the framing has rotted, the outside sheathing is all stripped off and in some instances the floor is removed also. All rotted portions, such as posts and framing, are removed carefully so as to damage them as little as possible. They are sent to the wood mill so that exact duplicates can be made. This has been found the most practical method, since the original timbers are specially made to fit the contour of the car and to allow clearance for rivet heads, bolts, angles and other parts. With the complete equipment of machines the mill can duplicate a piece of complicated framing much more quickly and at less cost than would be possible if the mechanics tried to fit the work on the job. The sheathing plates, if they are badly corroded or bent, are sent to the sheet metal department for straightening or duplication. The heavier metal work and framing is sent to the machine shop and the blacksmith shop to be straightened or duplicated. Collision bumpers, which frequently are badly bent, are taken off if necessary and are reheated and bent to the proper shape.

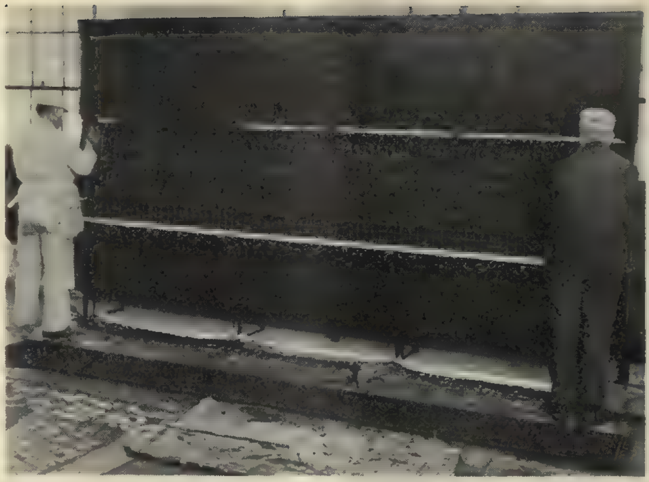
After repairs have been made to the various parts removed, or duplicates are furnished, they are returned to the car for installation. Meanwhile, the framing has been restored to its original condition. The car is then resheathed, the floor is re-laid and it is made ready for replacement of the parts which are ready. The doors and windows are replaced first. When they are on, the car is sent to the paint shop. The final trimming, including replacement of seats and window screens, is not done until the car is practically ready for delivery to the carhouse. At this time all glass is cleaned and the car is sent back for duty.

When the car has been transferred to the paint shop, it is gone over to get it ready for painting. First it is cleaned thoroughly, scraped and sand-papered. If any of the old paint is blistered or unfit to take new paint, it is removed with a paint remover down to the bare metal or wood. After use of the paint remover the surface is thoroughly washed. All bare metal or new work is thoroughly primed, if this has not been done already in the wood shop, as repairs progress. Then the entire car is gone over, all holes and dented spots are puttied up. The car roof is then painted. This obviates any danger of daubing the sides of the car, which might happen if the

Inspection of cars at the carhouses permits many minor repairs and adjustments to be made without the need for sending them to the Everett shops

roof were painted last. Next, the main body or under coat is put on. Some years ago the cars were all painted a fairly dark green. This was changed to a bright orange and at the present time there are no more green cars in service. This makes it necessary to be certain that the main body or under coat completely covers the green, without affecting the color of the finished coat.

After the main body coat has dried thoroughly, the enamel coat is put on. This is the final coat in all instances except the main line elevated cars equipped with wooden sash, which are given a coat of finish varnish. After the enamel coat all numbering and lettering, which is all hand work, is done.


Window screens are cleaned and then painted by dipping in narrow vats

As the exterior painting progresses, the inside work is being done simultaneously. As a rule only varnish is used on the interior, except for the sash, doors and headlining. The floors are given a heavy coat of floor paint. Trucks are painted with a paint made up by boiling the left-over paint skins with the addition of whatever pigment is necessary to bring the paint to a standard color.

Following the last coat and drying of the car, the glass is cleaned and the car is retrimmed with replacement of the hardware, seat cushions and backs, and window screens. Finishing of these other parts is done in other departments of the paint shop. The seats, cushions and sash are kept together for each individual car, being transported on trucks designed specially for the purpose.

Buses follow the same procedure as cars. On account of the lighter construction and the more severe strains imposed by rough roads, it frequently is necessary to make more extensive repairs to the framing than is made on cars. The bodies are somewhat smaller than those of cars, so that the time taken is approximately the same.

As an indication of the amount of work handled in the Everett shops, it may be stated that 797 passenger cars were given general repairs during 1929, and 664 cars were given light repairs. These figures are considerably lower than the corresponding figures for 1928. The difference is due largely to the better maintenance that has been done during the past few years, and also to the campaign that has been going on among the operating men to reduce accidents and damage to the equipment. In addition to the passenger cars, 21 service and other cars were given general repairs and 33 were given light repairs during the year. Snow plows to the number of 26 were given general repairs and eight were given light repairs during the year. The maintenance of buses has now become a considerable part of the work, 144 going through the shops last year for general work. Ultimately it is planned to assemble all of the repair work at the Everett shops. At present, truck work and heavy machine work is done at the Albany Street shops. However, a large amount of miscellaneous work is handled at Everett. For instance, sign painting is one of the larger activities connected with car repairs. More than 20,000 curtain signs were changed or replaced last year, and in addition several thousand of miscellaneous signs were made or repaired. Doors and sash are manufactured in comparatively large quantities for replacements.

A detailed description of the Everett shops was published in Electric Railway Journal at the time of their completion, in the issues for Nov. 22, 1924, page 871; Dec. 13, 1924, page 989; Dec. 27, 1924, page 1065, and Jan. 31, 1925, page 173.

Seat cushions and backs, after removal, are placed in racks on trucks arranged to carry the entire set for one car, as indicated on the placard attached to the handle

LUBRICATING Car Apparatus

By

H. L. KAUFFMAN

Denver, Col.

Small electrical apparatus installed on cars requires proper lubrication no less than do the heavier items of equipment. Particularly careful attention should be paid to the lubrication of air compressors, door engines, motorman's valves, air-brake cylinders, foot valves, circuit breaker cylinders, brake hangers, brake-adjusting rods and other parts of brake rigging, center plates, trolley wheels and bases, as well as ball and roller bearings for motors and journals

AIR compressors on electric railway cars should be inspected at regular intervals. The oil-filling elbow of motor-driven air compressors is usually placed low on the side of the crank chamber near the motor. Its location is such that it serves also as an oil gage. The normal oil level should be approximately ⅛ in. below the top of the filling elbow. Whenever it has dropped to ⅜ in. below the top of the filling tube, new oil should be added. Under ordinary conditions new oil will be required only once in several inspections.

Oil around or near the safety drain indicates that the vent pipe requires immediate attention. In removing a vent pipe a socket wrench should be used in preference to a monkey wrench or an open-end wrench. When the vent pipe is put back into place, care should be taken to see that the pipe threads are well shellacked. The condition of the vent pipe can be determined by holding the hand under it. If no sign of air is issuing therefrom, the pipe is probably clogged with dirt; but if light puffs of air come out, it is clear. If the vent pipe is clogged, oil from the armature bearing cannot return to the chamber as it should, but will be discharged through the safety drain and wasted. Every effort, therefore, should be made to keep the vent pipe open. If a compressor is found with the vent pipe clogged, a notation should be made of this fact; then, if at the next regular inspection oil has reappeared on the compressor frame below the drain, the ½-in. plug at the bottom of the oil-return should be removed and the oil-return passage cleaned. The pipe plug at the bottom of the settling well should be removed once a year or oftener, and any sediment that may have collected drawn off.

By observing the following precautions in the care and operation of air compressors, satisfactory lubricating results should be obtained:

1. All oil passages should be kept clear to insure proper oil circulation.
2. Oil should be renewed periodically.
3. The outside of the compressor should be kept clean to aid cooling.
4. The suction air strainers should be kept clean to prevent entrance of dirt into the oil and to insure an unrestricted air flow. A plugged strainer may increase motor speed as much as 50 per cent above normal. This will cause the armature to throw oil through the breather pipes.

LUBRICATION OF DOOR ENGINES

All working parts of door-engine valves are lubricated automatically. A semi-fluid grease, usually of the calcium-soap-containing type, is placed in the gear chamber of the engine works past the piston cups and into the free exhaust ports in the cylinder walls. Thereafter, the grease finds its way through the air passages and valve to the gear chamber. Thus a sufficient quantity of lubricant gets to the valve to keep the parts lubricated.

In selecting a lubricant for this purpose, the following points must be kept in mind:

1. The lubricant should not prove detrimental to the leather packings. Any grease containing rosin as a solidifier is highly injurious to leather.
2. The lubricant should be light enough to flow to all parts requiring lubrication, including the valves, and yet not be so "soupy" as to drip from the engine, such a condition—especially where the engine is located over the door—being apt to damage a passenger's clothes.
3. It should be a grease with practically no difference in consistency at temperatures of 0 and 100 deg., so that it will not become too thin in summer nor too hard in winter.
4. Exhausting of the compressed air in the gear cavity of the engine tends to atomize and carry away the liquid part of the lubricant. The lubricant, therefore, should be of such a nature that it mixes with the condensation of the exhaust, thus remaining soft and compensating in a great degree for the liquid part that is carried away by the exhaust. In other words, the grease must circulate with the air and motion of the piston to lubricate all parts regardless of temperature conditions, during which time it must retain a suitable consistency.
5. The grease should have good lubricating qualities.

One charge of grease in a door engine will last about a year, after which it will probably be found that a small

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This is the fourth of a series of articles on lubrication. Articles in the Oct. 20, 1928, Nov. 17, 1928, and Jan. 19, 1929, issues of ELECTRIC RAILWAY JOURNAL discussed the kinds and grades of lubricants suitable for use on electric railway equipment, kind of waste preferable for use, how to saturate the waste with oil, modern practice in packing the "down-feed" motor, how modern-type motors are lubricated, modern bearing oiling devices, causes of bearing lubrication troubles, journal lubrication, linings and lining metals, re-babbitting bearings, and proper methods of lubricating gears and pinions.

quantity should be added. At the end of about the second year, the engine should be removed from the car, taken to a bench, dismantled, thoroughly cleaned, new piston cups installed and, if necessary, a new charge of grease put in the gear chamber. Likewise, at this time, the air strainer should be cleaned thoroughly and the pipes blown out before replacing the engine. The quantity of lubricant required varies with the different sizes of engines, but, ordinarily, it will be about 1 lb.

At the end of approximately each four or six months, a small quantity of graphite grease should be placed on the pins in the terminals; and about once a month the oil cavity in the slide block on the door slide should be filled with heavy oil. Where door engines are placed in a remote position or are so located that a mechanical control is not convenient, then a pneumatic valve puller, which is nothing more than an auxiliary cylinder, is generally employed. The cylinder walls of the pneumatic valve puller should be lubricated with a light oil, which is supplied through the forward supporting capscrew to a felt-wiping pad attached to the piston. Care should be taken to use an oil light enough in body to be absorbed by the felt and thus carried around the bore of the cylinder.

For the lubrication of the motorman's valve, air-brake cylinders, foot valves and circuit breaker cylinders, a semi-fluid grease like that used on door engines should be employed. These parts are dismantled whenever the equipment is being overhauled, at which periods it is advisable to coat the valve seats with grease. This same semi-fluid grease should also be placed in the cylinders, using an amount therein proportional to the dimensions. For valves, the lubricant must be so adhesive as to be able to resist the corrosive action of the air, in consequence of which it will continue to aid in the tight fit of the valve seats. It must not gum or undergo more than a slight change through the temperature range to which the equipment is subjected. For cylinders, it must retain a consistency that will insure its spreading. It must possess non-leaking qualities and must preserve the pliability of the leathers or cups without attacking them chemically.

Pressure Grease Best for Brake Rigging

On trucks equipped with half-ball brake hangers and brake-adjusting rods, modern practice consists in the use of Alemite fittings for lubrication purposes. Grease is the lubricant used. The fittings are installed at the center of the half-ball brake-hanger castings, so the grease will flow to each hanger. On the brake-adjusting rods, the fittings are installed over the threaded part of the castings. Advantages of this method of lubrication are that lubrication can be carried out easily and regularly when Alemite fittings are applied. Expensive castings have a longer life and there is a decrease in the noise from trucks. A considerable saving in time and labor results and adjustment is much easier. In many instances, the practice still consists in swabbing the moving parts with a black oil or slop oil, this being done frequently enough to insure positive operation.

Until a comparatively recent date satisfactory lubrication of center plates presented a difficult problem. Now, however, an oil-retaining center bearing is in use on most modern car trucks. A brass wear ring constantly in a bath of oil—with felt rings to keep out dust between the body and truck center plates—facilitates smooth and steady riding and lessens flange and rail wear at curves. Such an oil-retaining center bearing is refillable from inside the car through a pipe in the body bolster.

Recently a check made by an equipment manufacturer of the yearly total cost of harps and wheels on a number of properties showed that the expense for making replacements, inspections and oiling of old-style trolley wheels amounted to more than twice the cost of the wheels alone. These costs did not take into consideration the cost of excessive wear, due to chattering and arcing wheels, the damage to car roofs due to dripping oil, and many other incidental expenses.

Trolley Wheels Made Self-Lubricating by Means of Graphite Plugs

On a type of trolley wheel lately developed there is no expense whatever for oiling or greasing, lubrication being fully automatic throughout the life of the wheel. Three graphite plugs, each providing sufficient lubricant for at least 30,000 miles of service, are used in this type of trolley wheel and harp. These plugs are especially compounded for this service and provide complete lubrication, without attention. They are not affected by heat, moisture or current. These graphite plugs are inserted in the axle and pressed outwardly against the wheel bearing surface, each by means of a coiled spring—two of the plugs pressing against the bottom of the wheel bearing and one against the top. They are of sufficient size and are spaced closely enough to insure constant lubrication of the entire bearing surface.

On the older types of trolley wheels the slide under the trolley fork should be lubricated frequently with the same grade of oil as is used on air compressors. The same lubricant should be used on the hub, if solid, or a soft grease, if the hub is hollow.

In the modern trolley base two tapered roller bearings, working in renewable tapered bearing cups, support the base and give free lateral trolley pole movement. Perfect inclosure, with unusual accessibility, are advantages of late-design trolley bases. Both bearings are protected against dirt and weather by the turret housing, which fits closely over the stem casting. They are adjustable without removal of the housing.

Ample lubrication over long periods is provided by cup grease packed within the housing, which serves as an effective grease chamber. A leather cup washer below the bottom bearing acts as a seal and prevents the leakage of grease from the bearing. A removable pipe permits easy renewal of the lubricant by means of a grease gun. Thus the need for frequent lubrication, or even inspection, is eliminated. On the older types of trolley bases the same grade of oil as used on the air compressors, applied at frequent intervals, will give satisfactory results.

Car oil of the proper seasonal grade is suitable for use in roller-bearing journals which are fitted for oil lubrication. Motor bearings of the ball-bearing type are usually fitted for grease lubrication, in which case a neutral soft cup grease should be used. In summer, a grease of higher melting point than the one applied in winter should be employed. Where the bearing depends upon felt to retain the lubricant, difficulties are apt to be encountered; for, unless particular care be taken to keep the felt in the condition necessary to retain the grease, "grease-throwing" will result. Use of a cylinder-stock grease will do much to overcome this difficulty, in many cases, with such a grease, no further application of lubricant is required upon ball-bearing motors for three or four months.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Denver Tramway Corporation, Denver, Colo.					
3 mo. end. Mar., 1930	1,060,205	727,162	123,083	221,804	96,149
3 mo. end. Mar., 1929	1,088,419	726,359	124,035	250,348	120,951
Capital Traction Co., Washington, D. C.					
March, 1930	353,563	252,484	27,385	75,219	45,692
March, 1929	385,572	257,297	29,101	101,079	72,088
3 mo. end. Mar., 1930	1,039,906	757,712	79,475	206,954	116,546
3 mo. end. Mar., 1929	1,071,395	757,297	82,405	236,423	147,935
Washington Railway & Electric Co., Washington, D. C.					
March, 1930	473,926	389,688*a*	....	105,835	46,643
March, 1929	521,264	421,512*a*	....	122,052	56,961
3 mo. end. Mar., 1930	1,399,414	1,147,387*a*	....	252,027	....
3 mo. end. Mar., 1929	1,458,169	1,206,050*a*	....	252,119	....
Jacksonville Traction Co., Jacksonville, Fla.					
March, 1930	95,864	71,829	9,248	13,998	....
March, 1929	106,697	78,467	9,899	17,596	....
12 mo. end. Mar., 1930	1,121,999	916,821	107,351	91,574	*65,995*
22 mo. end. Mar., 1929	1,187,402	959,261	107,224	114,445	*47,423*
Honolulu Rapid Transit Co., Honolulu, T. H.					
March, 1930	89,848	53,790	8,819	28,423	16,308
March, 1929	93,807	51,715	12,990	30,271	19,042
3 mo. end. Mar., 1930	259,325	160,079	26,458	76,161	40,393
3 mo. end. Mar., 1929	266,939	151,931	38,610	79,967	46,297
Chicago Surface Lines, Chicago, Ill.					
April, 1930	4,981,987	4,077,371*a*	....	904,616	88,634
April. 1929	5,284,261	4,161,453*a*	....	1,122,808	181,668
Duluth-Superior Traction Co., Duluth, Minn.					
3 mo. end. Mar., 1930	469,984	375,760	....	94,224*e*	14,965
3 mo. end. Mar., 1929	516,197	415,662	....	100,535*e*	20,421
3 mo. end. Mar., 1928	557,329	419,372	....	137,957*e*	50,313
3 mo. end. Mar., 1927	567,240	421,877	....	145,363*e*	62,002
Boston Elevated Railway, Boston, Mass.					
March, 1930	2,987,744	1,988,413	135,158	871,989	178,957
March, 1929	3,133,633	2,047,100	147,115	943,930	245,409
Eastern Massachusetts Street Railway, Boston, Mass.					
March, 1930	711,460	449,064	30,585	240,849	159,907
March, 1929	729,038	449,053	36,485	321,785	229,980
3 mo. end. Mar., 1930	2,154,889	1,315,839	97,431	770,407	527,497
3 mo. end. Mar., 1929	2,315,310	1,377,799	104,898	880,389	602,477
Greenfield & Montague Transportation Area, Greenfield, Mass.					
3 mo. end. Mar., 1930	21,860	16,848	....	5,011	....
Springfield Street Railway, Springfield, Mass.					
3 mo. end. Mar., 1930	677,390	485,239	8,972	101,451	81,727
3 mo. end. Mar., 1929	729,746	529,492	10,143	101,928	88,191
Kansas City Public Service Co., Kansas City, Mo.					
March, 1930	736,416	555,535	41,675	139,205	63,427
March, 1929	798,223	606,734*a*	....	191,489	126,349
3 mo. end. Mar., 1930	2,187,525	1,693,856	125,025	368,643	143,658
3 mo. end. Mar., 1929	2,319,597	1,879,448*a*	....	440,148	248,297
Illinois Terminal Company, St. Louis, Mo.					
February, 1930	529,212	379,519	24,000	125,693	82,514*d*
February, 1929	556,441	446,609	21,262	88,467	43,477*d*
2 mo. end. Feb., 1930.	1,106,604	801,450	48,000	257,154	166,740*d*
2 mo. end. Feb., 1929.	1,181,631	871,357	42,524	267,627	178,780*d*
Illinois Terminal Company, St. Louis, Mo.					
March, 1930	579,969	400,086	24,000	150,883	111,120*d*
March, 1929	601,931	409,687	21,262	170,981	138,939*d*
3 mo. end. Mar., 1930	1,681,572	1,201,536	72,000	408,036	277,858*d*
3 mo. end. Mar., 1929	1,783,562	1,281,044	63,786	438,608	317,719*d*
International Railway, Buffalo, N. Y.					
3 mo. end. Mar., 1930	2,588,351	2,219,557*a*	....	391,370	73,881
3 mo. end. Mar., 1929	2,727,178	2,283,963*a*	....	459,885	133,821
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
March, 1930	81,589	64,527	4,800	17,229	*13,265*
March, 1929.	89,181	63,507	7,840	20,115	*11,797*
3 mo. end. Mar., 1930	261,724	195,350	14,400	67,905	*24,917*
3 mo. end. Mar., 1929	263,548	188,997	23,520	58,473	*36,454*
Brooklyn-Manhattan Transit System, New York, N. Y.					
April, 1930	5,074,571	3,235,271	343,536	1,569,249	802,168
April, 1929	4,096,664	2,611,610	289,188	1,270,682	530,727
10 mo. end. Apr., 1930.	50,401,124	33,304,266	3,290,997	14,533,464	6,788,340
10 mo. end. Apr., 1929.	40,120,188	25,866,115	2,800,937	12,299,400	5,228,402
Brooklyn & Queens Transit System, New York, N. Y.					
April, 1930	1,936,880	1,529,944	114,126	318,161	195,127
April, 1929	2,000,676	1,674,860	103,386	245,058	119,267
10 mo. end. Apr., 1930.	19,589,976	15,408,223	1,147,861	3,249,387	1,995,199
10 mo. end. Apr., 1929.	19,952,805	16,555,514	1,070,649	2,543,146	1,260,056
Hudson & Manhattan Railroad, New York, N. Y.					
April, 1930	1,063,729	515,470*a*	....	548,259	213,380
April, 1929	1,065,969	533,954*a*	....	532,015	19[illegible],655
4 mo. end. Apr., 1930.	4,222,990	2,096,432*a*	....	2,126,558	788,092
4 mo. end. Apr., 1929.	4,210,611	2,127,889*a*	....	2,082,722	739,383
Interborough Rapid Transit Co., New York, N. Y.					
March, 1930	6,436,421	3,902,136	262,623	1,178,440	*199,385c*
March, 1929	6,283,363	3,595,957	204,197	2,056,916	682,255
9 mo. end. Mar., 1930	54,351,905	33,813,718	1,877,425	10,748,163	*1,630,650c*
9 mo. end. Mar., 1929	51,596,671	31,789,328	1,807,718	14,198,969	1,803,917

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Long Island Railroad, New York, N. Y.					
February, 1930	2,766,934	2,178,709	104,138	483,477	345,317*d*
February, 1929	2,758,438	2,109,666	96,141	551,998	420,935*d*
2 mo. end. Feb., 1930.	5,696,187	4,525,608	203,510	966,359	686,943*d*
2 mo. end. Feb., 1929.	5,662,862	4,374,014	187,899	1,096,971	830,634*d*
Long Island Railroad, New York, N. Y.					
March, 1930	2,958,720	2,332,082	123,435	501,962	360,645*d*
March, 1929	3,043,395	2,307,337	113,967	616,970	477,557*d*
3 mo. end. Mar., 1930	8,654,907	6,857,690	326,945	1,468,321	1,047,588*d*
3 mo. end. Mar., 1929	8,706,257	6,681,351	301,866	1,713,941	1,308,191*d*
New York Railways, New York, N. Y.					
March, 1930	420,100	427,031*a*	....	*6,931*	*27,246b*
March, 1929	490,200	470,003*a*	....	20,197	*1,255b*
3 mo. end. Mar., 1930	1,218,025	1,244,561*a*	....	*26,536*	*101,442b*
3 mo. end. Mar., 1929	1,358,860	1,350,066*a*	....	8,794	*69,405b*
New York, Westchester & Boston Ry., New York, N. Y.					
March, 1930	208,434	114,670	24,832	69,926	*157,515*
March, 1929	199,071	125,717	19,824	54,234	*158,014*
3 mo. end. Mar., 1930	609,552	347,156	73,856	190,806	*495,776*
3 mo. end. Mar., 1929	563,456	378,052	58,304	129,149	*499,719*
Staten Island Rapid Transit Co., New York, N. Y.					
February, 1930	186,727	139,489	17,500	29,738	33,055*d*
February, 1929	213,270	160,782	18,000	34,485	*3,072d*
2 mo. end. Feb., 1930.	375,104	291,738	35,000	48,336	42,934*d*
2 mo. end. Feb., 1929.	441,421	336,991	37,000	67,422	*4,854d*
Staten Island Rapid Transit Co., New York, N. Y.					
March, 1930	188,807	154,981	17,500	14,784	*6,205d*
March, 1929	247,109	174,591	18,000	54,518	17,126*d*
3 mo. end. Mar., 1930	563,911	446,719	52,500	63,150	36,729*d*
3 mo. end. Mar., 1929	688,530	511,582	55,000	121,940	12,272*d*
Third Avenue Railway, New York, N. Y.					
March, 1930	1,252,562	958,150	90,147	222,006	*8,270*
March, 1929	1,347,229	1,021,953	91,710	256,169	*6,738*
9 mo. end. Mar., 1930	11,317,336	8,738,310	800,383	1,953,060	*315,333*
9 mo. end. Mar., 1929	11,571,009	8,956,387	816,731	1,986,722	*313,982*
New York State Railways, Rochester, N. Y.					
3 mo. end. Dec., 1929.	2,267,725	2,083,476*a*	....	184,249	*165,346*
3 mo. end. Dec., 1928.	2,395,029	2,339,016*a*	....	56,013	*320,152*
Philadelphia & Western Railway, Norristown, Pa.					
March, 1930	59,706	54,368*g*	....	....	5,338
March, 1929	67,652	55,907*g*	....	....	11,745
3 mo. end. Mar., 1930	174,948	158,6[illegible]1*g*	....	....	16,347
3 mo. end. Mar., 1929	191,494	161,803*g*	....	....	29,691
York Railways, York, Pa.					
3 mo. end. Mar., 1930	805,906	504,926*g*	....	....	300,980*f*
3 mo. end. Mar., 1929	763,816	463,308*g*	....	....	300,508*f*
12 mo. end. Mar., 1930	2,883,040	1,932,878*g*	....	....	950,162*f*
12 mo. end. Mar., 1929	2,706,151	1,776,808*g*	....	....	929,343*f*
Galveston-Houston Electric Railway, Houston, Texas					
March, 1930	42,390	26,350	2,606	13,429	....
March, 1929	49,771	28,292	2,565	18,912	....
12 mo. end. Mar., 1930	565,531	322,915	32,517	210,290	*59,154*
12 mo. end. Mar., 1929	629,788	354,593	31,705	243,488	*27,214*
Houston Electric Co., Houston, Texas					
March, 1930	274,515	172,307	22,502	79,704	....
March, 1929	299,280	179,185	24,582	95,911	....
12 mo. end. Mar., 1930	3,336,205	2,069,787	267,039	1,017,625	623,313
12 mo. end. Mar., 1929	3,368,704	2,088,441	288,870	991,392	580,831
Pacific Northwest Traction Co., Seattle, Wash.					
March, 1930	77,748	59,130	4,451	14,165	....
March, 1929	72,952	60,404	4,366	8,180	....
12 mo. end. Mar., 1930	983,795	709,670	54,964	219,160	103,770
12 mo. end. Mar., 1929	883,769	746,547	51,456	85,764	*51,629*
Edmonton Radial Railway, Edmonton, Alta.					
March, 1930	77,239	47,472	....	29,766	2,539
March, 1929	77,957	45,541	....	32,416	5,068
3 mo. end. Mar., 1930	238,390	146,412	....	91,978	7,638
3 mo. end. Mar., 1929	234,049	135,143	....	98,906	13,862
Lethbridge Municipal Railway, Letherbridge, Alta.					
2 mo. end. Feb., 1930	10,256	8,264	....	1,992	*3,179*
2 mo. end. Feb., 1929	....	....	....	....	*2,456*
Guelph Radial Railway, Guelph, Ont.					
3 mo. end. Jan., 1930	25,720	21,093	259	4,368	*4,757*
3 mo. end. Jan., 1929	....	....	....	....	*5,894*
Regina Municipal Railway, Regina, Sask.					
2 mo. end. Feb., 1930	87,637	55,542	....	31,825	7,697
2 mo. end. Feb., 1929	....	....	....	....	12,968
Havana Electric Railway, Havana, Cuba					
3 mo. end. Mar., 1930	1,356,063	1,148,840*a*	....	213,227	53,642
3 mo. end. Mar., 1929	1,377,748	1,124,020*a*	....	260,892	99,919
3 mo. end. Mar., 1928	1,367,984	1,162,432*a*	....	218,098	57,134

a Includes taxes. *b* Before adjustment bond interest. *c* After paying rentals on city-owned subways. *d* Net after rents. *e* Before taxes. *f* Before depreciation. *g* Including operating expenses, taxes and income deductions.

Equipment for Overhead Maintenance Modernized on Eastern Massachusetts

Twenty new tower trucks have been purchased and equipped for maintenance work on either overhead line or underground cable jobs. Each operating district is equipped with one or more standard units

Maximum width was specified for the heavier type Mack and Brockway trucks so that adequate lockers and inside body space might be obtained

IN ORDER to permit more efficient and economical maintenance of overhead lines and underground cables along its 585 miles of track, the Eastern Massachusetts Street Railway has purchased and specially equipped twenty new motor line trucks. The vehicles were designed so as to give each of the twelve operating divisions at least one universal truck that could be used for all kinds of line work in that division rather than to have a number of different types of trucks which operated in all divisions.

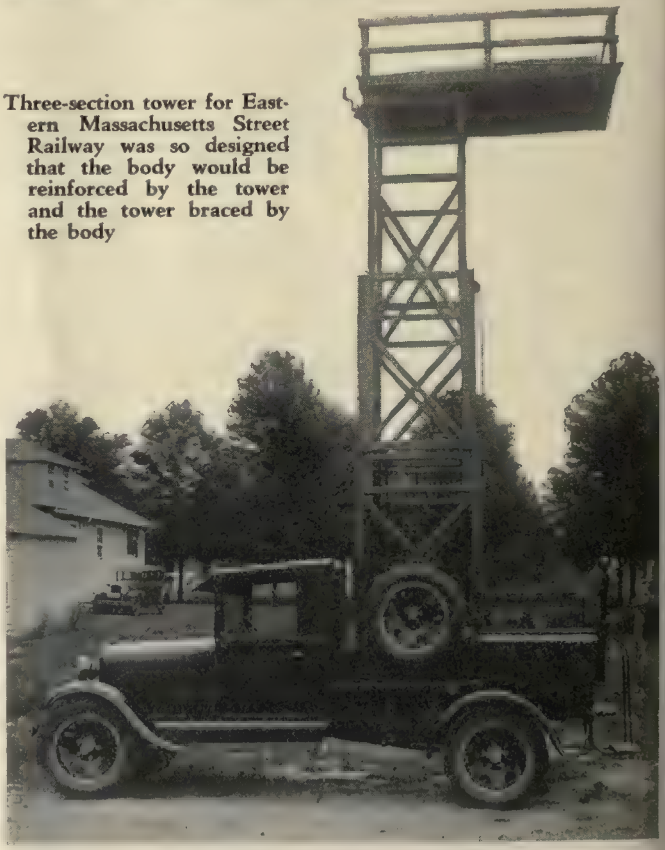
The equipment consists of eight 2-ton Macks, ten 1¼-ton Brockways and two 1-ton Fords. The 1¼-ton capacity trucks are designed for so-called emergency service and to serve as auxiliaries for the heavier wire and cable work. The 2-ton power trucks are for use on heavy construction work such as setting poles, running feeder and trolley wire, while the light 1-ton unit is used as auxiliary equipment in two of the districts. Both the 1¼-ton and 2-ton units have the same general design for tower and body except in respect to weight and size. The bodies were built by the J. R. McCardell Company, Plymetl being used for the sides.

In building the new vehicles it was thought desirable to increase the width over that of the trucks previously used; in fact, the new trucks are very close to the statute limit for the width of vehicles in the state of Massachusetts. This was done to make available a large amount of room for locker space, leaving the inclosed portion of the body clear for other operations such as loading trolley wheels, running trolley wire and temporary loading with heavy construction material.

In order to obtain the required operating height of 18 ft. from ground to platform, it was considered necessary to have a three-section tower. The problem was to build this kind of tower and place it on the truck so as to retain for other uses the space inside the corners of the tower. To accomplish this, it was necessary to recess the body so that the tower would come entirely inside of the back line of he locker space and at the same time not foul the body sides. This was accomplished by an arrangement whereby the body is reinforced by the tower and the tower is braced by the body. At the same time a large available space inside of the tower was retained for storage of tools and equipment.

Each of the 2-ton trucks is equipped with a power winch for general use. The winch is so arranged that by use of suitable sheaves, built into the body, it may be used for loading, pulling cable, or for operating a pole-

Three-section tower for Eastern Massachusetts Street Railway was so designed that the body would be reinforced by the tower and the tower braced by the body



The open-type, light-weight Ford units are used as auxiliary equipment in two divisions

setting derrick. Because of the built-in body, the standard arrangement for the pole derrick could not be used, therefore a modified design was employed so that the stiff leg and sheaves at the top of the derrick come outside of the right-hand side line of the built-in body. The winches used are Mead-Morrison No. 908, mounted on the rear right-hand side so that the niggerhead can be pulled outside of the body line when in use and when not in use can be pushed back inside of the body line and there secured out of the way.

The bodies were built according to the railway's specifications, the principal dimensions being as follows:

General Dimensions of New Tower Trucks

	Mack	Brockway
Over-all length of body platform	12 ft. 0 in.	10 ft. 0 in.
Over-all width of body platform	7 ft. 4 in.	6 ft. 4 in.
Width of body inside, in the clear	4 ft. 4 in.	3 ft. 6 in.
Over-all width of tower frame	4 ft. 7 in.	3 ft. 5¾ in.
Over-all length of tower frame	4 ft. 3½ in.	3 ft. 3 in.
Height of body inside at center	5 ft. 8 in.	5 ft. 3½ in.
Over-all length of main body	7 ft. 6½ in.	6 ft. 7 in.
Length of body section under tower, approximately	3 ft. 7½ in.	2 ft. 5 in.

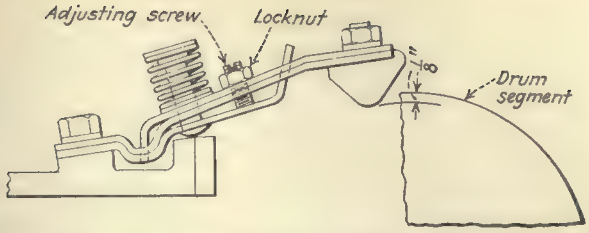
◆

Installation and Adjustment of Compensating Controller Fingers

By G. L. Moses

Renewal Parts Engineering Department
Westinghouse Electric & Manufacturing Company

When compensating fingers are used on the controller, the adjusting screw should be set to give a ⅛-in. lift from the free position when the finger tip is on the drum segment. This lift should be measured from the true surface of the drum and not from the worn or burned arcing tips or segments. It is desirable in order to obtain the full advantages of the improved fingers, to install new contact segments when applying new fingers. The adjusting screw should always be secured with the locknut after adjustment. An inspection should be made after installation to see that the fingers are not forced to the limit of their travel at any position as the drum is rotated. This can be checked by observing if the finger can be lifted off its operating position on the segment. The lift should be checked at each position where a finger rises on a drum segment when the drum is rotated in either direction. When the fingers are properly installed and adjusted, "compensating" action will be obtained which results in full line contact. As the finger tips and drum segments wear, adjustment should be made to maintain the recommended ⅛ in. lift. Proper adjustment of the finger will insure long life and satisfactory operation and eliminate stubbing.



Adjusting screw of compensating controller finger should be set to give ⅛-in. lift from free position

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Wrench for Wheel Nuts*

By Jack Kehoe

Foreman St. Clair Garage
Cleveland Railway

In order to tighten or loosen wheel nuts on buses of the Cleveland Railway, a Tee wrench with a 4-ft. handle has been developed. As ordinary steel forgings were thought not to have sufficient strength to stand up under this kind of work, alloy steel was used for the head of the wrench. This was made by a local wrench manufacturer. At one end of the cross member is a large hexagonal socket for the outer wheel nut and at the other a square socket for the cap nut. These are standard heavy duty sockets of alloy steel welded to a cross bar of the same material. The head of the wrench is provided with a 10-in. handle arranged to receive a long pipe handle. In shop service the pipe handle is welded to the head of the wrench but for emergency cars and portable tool sockets, the pipe handle is detachable.

Alloy steel Tee wrench developed for tightening or removing wheel nuts on buses of the Cleveland Railway

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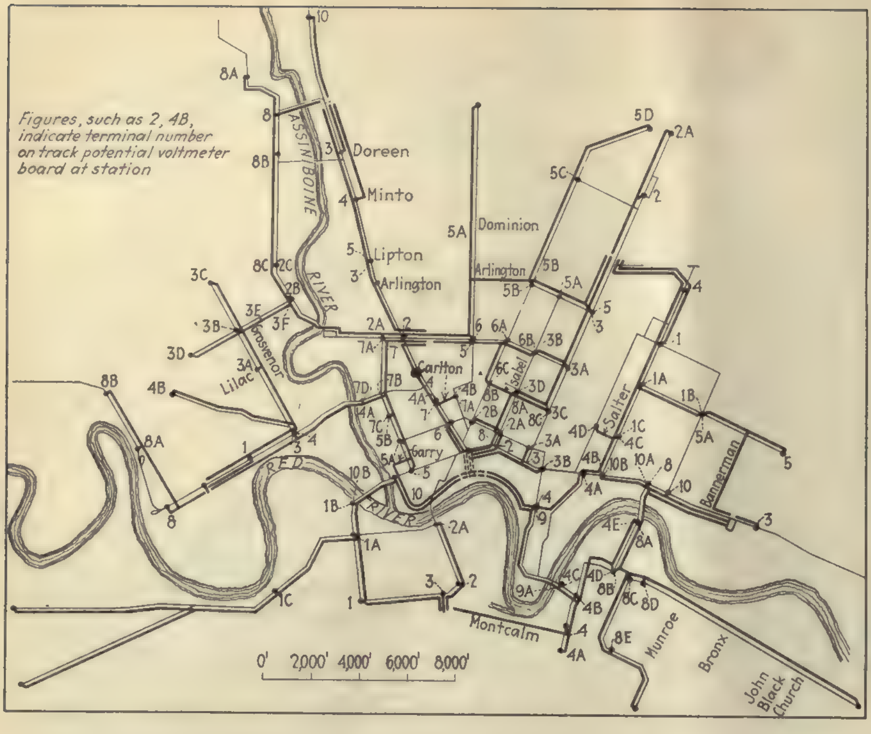
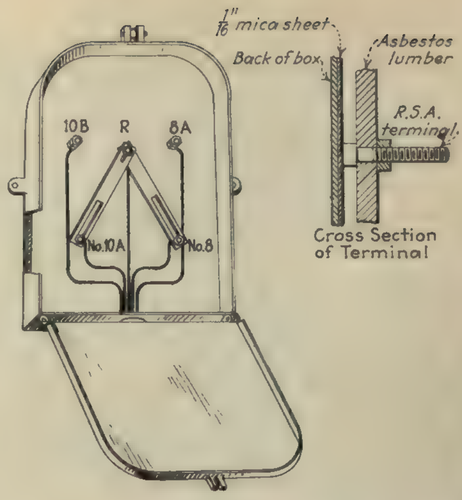
*Submitted in Electric Railway Journal Prize Contest.





The wire terminates in switch boxes with convenient terminals and connectors which facilitate any desired arrangement of circuits

At left — Permanent track potential wires have been installed all over the city of Winnipeg to facilitate the making of electrolysis voltage tests

Potential Wires Check Electrolysis

By H. G. Stewart

Superintendent Railway Distribution
Winnipeg Electric Company

COMPLYING with what is known as the electrolysis act, which was passed some time ago by the Manitoba Legislature, the Winnipeg Electric Company has installed 223,000 ft. of No. 8 twin-braided, waterproof wire. These lines cover the entire railway system for the purpose of checking potentials between various points on the tracks.

In order to facilitate periodic testing of track potentials the wires, which in general parallel the track system, are arranged with rail taps and switches mounted on adjacent poles. It is possible to record tests from any railway substation to any point on the track or between any two points on the track.

In each substation the wires terminate on special switchboard panels which are equipped with recording voltmeters of the smoked-chart type, having ranges of 25-0-25 volts, 5-0-5 volts, 0.5-0-0.5 volts. In making a test, before a recording voltmeter is connected in circuit, the lines to be used are checked to prove that they are free of open circuits or accidental grounds by talking over the line at both ends through the rail using telephone headsets in series with three or four dry cells.

The relation of the track system and the potential wires, switchboard designations and distance in feet between rail taps, is shown in the map. Permanent rail connections are made by placing a No. 9 wire in a ½-in. conduit extending from the rail to the pole, and up the pole a distance of 8 ft. The wire is connected to the rail by soldering to a short length of 0000 cable, which in turn is welded electrically to the rail.

For the convenience of the testers, a complete list of the locations of test points has been made in booklet form. This gives the number of the test points, the street location, and the distance in feet between the points and the rail nearest the substation. The arrangement of switch boxes at each location is also shown.

In the original installation, the test switches consisted of 30-amp. battery switches, but it was found that these soon became defective. Since the tests were not dependable, a special arrangement of terminals was made. This is shown in the small diagram.

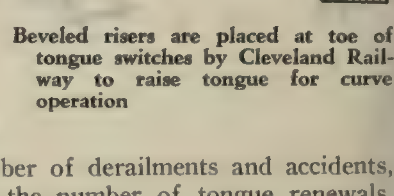
◆

Raised Toe Tongue Switch*

By E. B. Spenzer

Special Work Engineer Way Department Cleveland Railway

TO OVERCOME tread wear on the toe of a tongue switch due to straight operation which reduces the guard action of the tongue when the curve is used, the Cleveland Railway inserts beveled risers in the bed of the switch. The bevel on these risers raises the tongue ⅛ in., when set for the curve run, and permits it to rest level with the tread, when set for the straight run. Around in the base of the tongue are two slots with the same bevel as the risers in order to have full bearing when the wheels pass over it on the straight run. This method of raising the tongue has not only reduced the number of derailments and accidents, but has also reduced the number of tongue renewals.



Beveled risers are placed at toe of tongue switches by Cleveland Railway to raise tongue for curve operation

In some locations where the mate and part of the outside curve and approach rails are lower than the switch, due to existing pavement and street grades, these tongue switches are bought from the manufacturer with the risers already built in.

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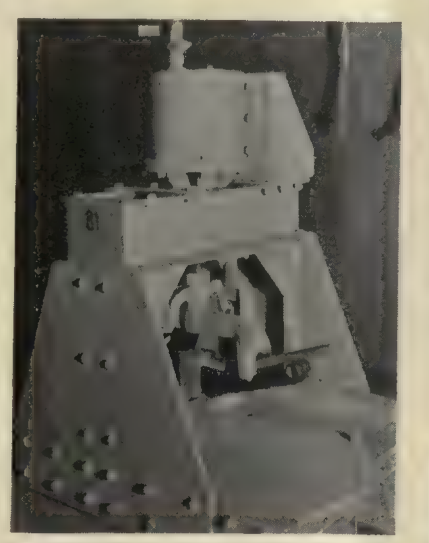
*Submitted in Electric Railway Journal Prize Contest.

Truck Springs Assembled by Pneumatic Machine*

By Hans Korn

Chief Engineer Hamburg Elevated Railway
Hamburg, Germany



Pneumatic machine used at Hamburg, Germany, in assembling the leaves of truck springs

ASSEMBLING the leaves of truck springs is done in the shops of the Hamburg Elevated Railway, Hamburg, Germany, by means of a pneumatic machine. This apparatus presses the leaves tightly together and thus facilitates the mounting of clips and straps. The device consists of a framework and a steel claw attached to the lower end of the piston of an air-brake cylinder. When air is admitted the claw moves downward and presses the leaves together thus permitting the mechanic to install the straps and clips. Much time has been saved by the use of this apparatus instead of doing the work by hand.

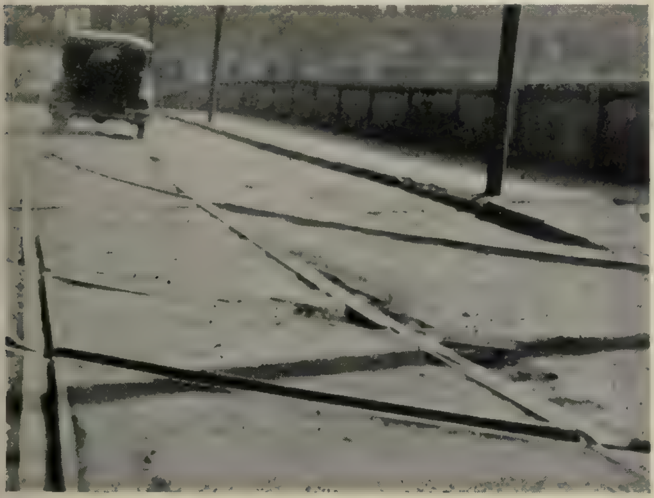
◆

Emergency Special Work Built in Place*

By W. S. Yeates

Georgia Power Company, Atlanta, Ga.

WHEN a bridge on one of Atlanta's main thoroughfares was condemned and closed to traffic with only a few days' notice, pending construction of a new bridge, it was necessary to reroute two important car lines of the Georgia Power Company that ran over the bridge. To do this without interruption of service it was necessary to build a block of double track and change a double-track curve into a double-track branchoff in order to reach another bridge nearby.



This emergency double-track branch off was made in place in Atlanta with Thermit welding

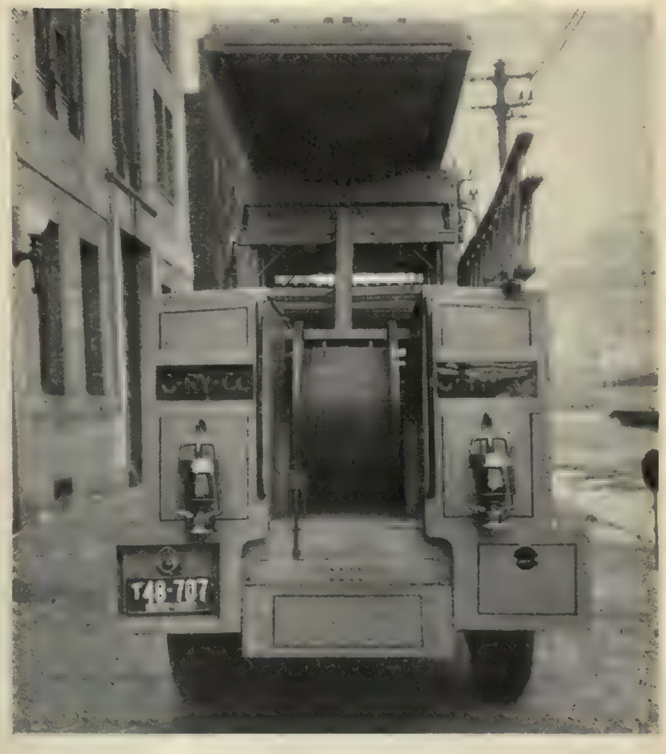
Suitable second-hand switches, mates and frogs were found, but it was necessary to build the curved crossing. As surveying, laying out and constructing the piece of special work would have taken too much time, it was decided to build the crossing in place, using Thermit welding. The gage lines of the straight track were marked on the curved rails in place and flangeways for the straight line cut through. Rails for the straight track were cut to length, the ends shaped, the pieces spiked in position and welded with thermit. The result was a crossing with no internal joints which has been entirely satisfactory for two years.

◆

Warning Lights on Tower Wagons*

By Angus G. Scott

Assistant Superintendent of Overhead Lines
Cleveland Railway



Neon-tube warning lights on rear of line trucks of the Cleveland Railway

BECAUSE of the increasing amount of line maintenance work being done at night in heavy traffic areas, a new tail-light has been designed for the rear of Cleveland Railway line division trucks. This tail-light is a red, neon-gas sign which reads "C. RY. CO." It is about 18 in. long with letters approximately 4 in. high. The neon tubes, well padded with rubber to prevent breakage due to vibration, are protected with a triplex glass plate. They are lighted from the ordinary 6-volt truck battery and a high frequency coil; the latter apparatus being furnished by the sign manufacturers. The light can be seen much farther than the ordinary tail light and stands out boldly in misty weather. It adds appreciably to the safety of the men working on the tower of the truck and is expected to prevent rear end collisions.

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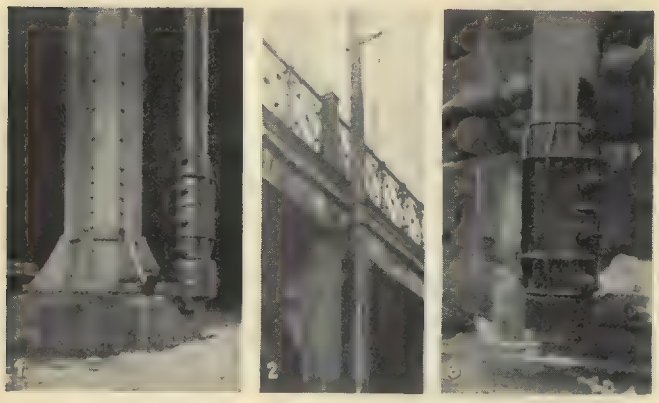
*Submitted in Electric Railway Journal Prize Contest.

Reinforcing Corroded Poles



Method of Reinforcing Poles on Bridge

1. Base of pole reinforced with malleable iron ground line reinforcing clamp.
2. A section was cut out of the pole to remove corroded portion and a splice made with malleable iron clamp.
3. Repair of corroded pole against stone abutment.

REPAIRS of an unusual nature were made recently to a number of poles on the Third Avenue Railway on a bridge over the Harlem River in New York City. These poles are erected alongside the columns supporting the bridge and are held in place by brackets attached to the foundation and to the caps heading the columns. After many years use the poles had corroded badly where they passed through these brackets and it was necessary to repair them or to replace them entirely.

Removal of the poles by cutting off the brackets, substituting new poles and rewelding the brackets in place was considered. Another method was tried, however, and has proved very satisfactory. The pole was loosened in the bracket attached to the cap on the column, and then cut off at the point of corrosion for about 6 in., the upper portion being dropped through the bracket so that a sound portion passed through the bracket and provided bearing surface. The pole was then spliced with a malleable iron reinforcing clamp.

At the bottom of the pole corrosion had occurred a few inches above the point where it fitted into the cup in the bracket. This portion of the pole was reinforced with a similar clamp attached immediately above the bracket. Where the poles were erected against stone abutments of the bridge a similar method was used with a different bracket supporting the pole.

◆

Washing Buses in Record Time*

By D. S. MacKay

Supervisor of Automotive Equipment
Boston Elevated Railway

CLEAN buses are considered an asset by the Boston Elevated Railway. To keep them in this condition, a plan has been worked out that has been quite successful. Rain or shine, every bus returning to the garage after the morning rush is met as it enters the garage by two hosemen and two or three scrubmen. A man with a hose with an ordinary nozzle stands on each side of the bus and wets the entire surface. Then two men with ordinary scrub brushes rub the wet surface, including the glass. They use no water other than that left by the hose. After the scrubbing, water from the hose is again sprayed over the bus. In 1½ minutes the bus is on its way to its berth and the next bus is in place for washing.

Not all buses return to the garage after the morning rush, but schedules are made so that none goes without washing for more than three days, while some are washed every morning. With this frequency of washing, dirt does not build up on the surface, and what does collect is removed easily by the periodical cleaning every 2,000 miles, or once about every 22 days. This work is done with a paste cleaner which is wiped off with a rag without the need for water. This cleaning follows the morning washing and is done by the same men. For periodical cleaning, 75 man-minutes are required to do the outside and 90 man-minutes to do the inside.

Buses which have been out of the shop for two or three years compare favorably with those on the road only two or three months after painting. The new system has made a great improvement in the appearance of the buses and was inaugurated with practically no increase in expense. The time for the washing has been cut and more time left for the periodical cleaning.

**Submitted in* Electric Railway Journal *Prize Contest.*

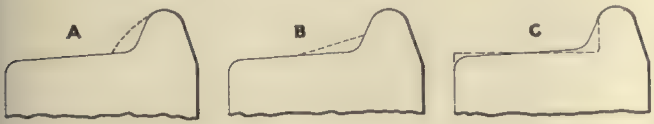
Two men with hose and two with scrub brushes clean each bus in 1½ minutes in the Boston Elevated garages

Grinding of Wheels Makes Maintenance Economical*

By J. B. Freeman
Dallas Railway & Terminal Company

GRINDING of car wheels to restore the contour before the wear has been so great that turning or welding are necessary has proved an economy of considerable value in Dallas. The work is done with a pit grinder, and the wheels are not removed from the car.

After running 15,000 to 30,000 miles, the flange on one wheel becomes thicker, and that on its mate begins to wear sharp. This occurs in one of two ways, as shown in the illustration. *A* and *B* represent two types of flanges that have become thicker, while *C* is typical of the opposite wheel, which has worn sharp. It will be found that the circumference of wheels *A* or *B* will be larger than that of wheel *C*.



Typical contours of wheels after service on Dallas street cars

Since wheels vary in size and contour, it is not possible to give definite figures for directing the grinding. To restore a wheel such as *C* it is only necessary to taper the tread, grinding away very little of it. None of the flange is ground away in a wheel such as *A*. The tread is ground down until it measures ⅛ in. to ¼ in. less in circumference than wheel *C*. In grinding the type of wheel represented by *B* it is necessary to establish a wide gage line bearing a fillet whose width is determined by the amount worn from wheel *C*. The tread is ground down until it measures ⅛ in. to ¼ in. smaller in circumference than wheel *C*. This fillet will roll up to the flange by the time the wheel has run 10,000 miles, and the flange then will resemble that of Fig. A. The slight difference in circumference will cause the wheel with the large flange to hug the gage line and equalize the wear. This grinding is done in the pit without removing the wheels, the machine being operated by one man. Flanges are being maintained by him on practically all the wheels of the 314 cars operated by the Dallas Railway & Terminal Company.

This system of equalizing wheel wear has been in use since January, 1929, after a series of experiments lasting about a year. We are getting 20,000 to 33,000 miles between grindings. On a 26-in. wheel three or four grindings will be needed for a life of 100,000 miles or more.

The cost of four grindings, including labor, electricity, oil, etc., is $7 per wheel or less. It saves 75 per cent of the wheels from being welded, and with experience a further reduction of flange welding is anticipated.

The cost of three weldings and finishings of a wheel, as given in the report of A.E.R.E.A. Rolling Stock Committee No. 10 on welding of wheel flanges, is $9.96. We find that three weldings of a flange are necessary during the life of 100,000 miles. The cost of removing and installing a wheel three times is $3.36, making a total cost of $13.32 for welding during the life of a wheel. Hence when a wheel can be maintained by grinding alone there is a saving of $6.32 per wheel.

Some of our wheels already have run 60,000 miles without being welded, and indications are that they will wear out without welding. It appears that there will be an increase of 20,000 miles in average wheel life, since there is very little waste of tread in grinding.

Installing Safety Zone Markers*

By W. P. Davis
Roadmaster United Railways & Electric Company
Baltimore, Md.

WHERE granite block paving is used, the installation of metal disks for marking safety zones on the street presents a problem on account of the necessity of drilling the blocks to receive the holding device. Usually there are only a few disks to be put down at a time and the job does not warrant the use of an air drill and its accompanying apparatus. In order to avoid the necessity for drilling by hand, which is a rather slow tedious process, the United Railways & Electric Company of Baltimore selects blocks of similar size to those in use in the street and drills them in the yard, where compressed air is constantly available. The metal disks are installed there. The blocks in the street where the disks are to go are removed and those with the disks attached are substituted.

Jig for Drilling Brake Hangers*

By Terence Scullin
Superintendent Equipment and Buildings
Cleveland Railway

Jig used in shops of Cleveland Railway permits continuous drilling of brake hangers

DRILLING of brake hangers has been expedited in the Harvard Shops of the Cleveland Railway by use of a special jig. This consists of a steel plate with a number of vertical posts which hold three brake hangers in position, each under a drill press. The method of operation is to start one drill to work on the right-hand hanger and then to start the second and third drills in succession. By the time the operator has started the third drill the first has completed its work and the hanger is ready for removal. Thus the process is practically continuous and one man is able to drill many more hangers than was possible with the old equipment.

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*Submitted in Electric Railway Journal *Prize Contest.*

NEWS *of the Industry*

LATE NEWS

Springfield, Mass. — The Springfield Street Railway will operate its Westfield line on a one-man car basis beginning May 25. This will establish the Springfield system on a 100 per cent one-man basis.

◆

Seattle, Wash. — Extension of the Beacon Hill car line of the Municipal Railway from West Spokane Street to Graham Street is authorized by a bill introduced in the City Council. To finance the project, the bill authorizes issuance of $56,000 in railway bonds. The proposed extension almost 2 miles long would be single track.

◆

Boston, Mass.—At a meeting of directors of Engineers Public Service Company, Matthew C. Brush, president of the American International Corporation, was elected to the board to fill the vacancy caused by the death of Dr. Arthur T. Hadley.

◆

Philadelphia, Pa.—The Reading Company has expanded its electrification program to include the Doylestown branch of the railroad and has appropriated $300,000 for the purpose, bringing the total electrification budget of the system to $20,300,000.

◆

Lansing, Mich.—Following the first of a series of rate hearings, Robert H. Dunn, chairman of Public Utilities Commission, said operators of bus lines in Michigan have agreed to establish a system of through fares over connecting lines.

◆

Harrisburg, Pa.—Substitution of bus for street car service between Mechanicsburg and Carlisle is proposed by the Valley Railways in petitions which were heard on May 22 by the Public Service Commission.

◆

Boston, Mass.—The Boston Elevated Railway will operate the night service between Market and Washington Streets, Cambridge, and Scollay Square in part by bus and in part by street car.

◆

Toronto, Ont.—The four municipalities of North York, Richmond Hill, Vaughan and Markham have voted to retain the services of the Metropolitan Radial Line, and, as a result, the joint Municipal Councils will proceed with negotiations to purchase the line from the City of Toronto at a price of $75,000.

◆

Washington, D. C.—The long pending merger bill, giving the assent of Congress to the coalition of "street railway corporations operating in the District of Columbia," finally has received a favorable report by the Senate District Committee. It is stipulated the unification agreement shall be subject to ratificaion by the majority stockholders of the companies. A similar merger bill is before the House District Committee.

(*Late News Continued on Page* 343)

United States Supreme Court Decides Columbia Case

Railway Service Ordered to Be Continued in South Carolina City Subject to Action to Determine a Proper Return

IN A decision handed down on May 19, the United States Supreme Court denied the right of the Broad River Power Company to suspend railway operation in Columbia, S. C. This ruling sustains an order of the South Carolina Supreme Court directing the Broad River Power Company and its subsidiary, the Columbia Railway Gas & Electric Company, to resume operation of the abandoned service.

The opinion rendered by the Supreme Court on the case held the corporate history of the company to be of paramount importance in determining whether or not operation of the service can be required. It is pointed out by the court that none of the special legislative acts defining the privileges conferred upon the corporations contains any words affirmatively providing that any part of the privileges granted should be deemed separable, or that they might be exercised independently of any other.

It was also ruled by the Supreme Court that the contention advanced by the company in regard to compelling a public service corporation to continue service at confiscatory rates, does not apply. The order compelling the company to serve does not involve a determination of whether or not the rate is confiscatory, it is pointed out. The written opinion of the Supreme Court states further that the order directing continuance of service does not foreclose appropriate proceedings for the determination of a proper return.

Announcements carried in editions of the afternoon papers at Columbia on May 19 that the United States Supreme Court had upheld the State Railroad Commission in its order to resume service were read eagerly by the people. At once the question was raised "When will the service begin?"

Ever since March, 1927, when the company stopped service, the question of transportation has been an outstanding one. At that time the State Railroad Commission ordered that service be resumed and required the company to show cause why service had been stopped without notice.

(*Continued on Page* 345)

COMING MEETINGS

May 27-29—National Conference on Street and Highway Safety, Washington, D. C.

June 16—National Association of Purchasing Agents, annual convention, Chicago, Ill.

June 23-26—American Electric Railway Association, 49th annual convention, San Francisco, Cal.

June 29-July 6 — International Tramway & Bus Association, biennial convention, Warsaw, Poland.

July 23-25 — Electric Railway Association of Equipment Men, Southern Properties, Nashville, Tenn.

July 24-25 — Central Electric Railway Accountants' Association, Cedar Point, Ohio.

Aug. 13-14—Wisconsin Utilities Association, Milwaukee, Wis.

Chicago Unification Ordinance Now Ready for Voters

On May 19 the Chicago City Council by a vote of 47 to 3 granted an indeterminate franchise to the Chicago Local Transportation Company, a merger of the financial interests in the present transit companies. This grant is subject to popular approval at the referendum to be held July 1, since Mayor Thompson has approved the plan.

According to the ordinance, the newly created company must consolidate the surface and elevated lines, operate city owned subways through the central business district, and feeder buses in the outlying districts. The ordinance calling for a public referendum July 1 was passed unanimously.

Members of the local transportation committee adopted a resolution authorizing Chairman McDonough to provide for a citizens' committee to prepare a plan of campaign for the ordinance. Ald. Arthur Albert notified the committee that no city funds shall be spent for ordinance propaganda.

One of the greatest obstacles to complete settlement of the railway problem was removed when representatives of various protective committees announced formally in letters to the City Council that the financial setup of the consolidated company has their approval and co-operation. All but one of these groups of participation certificate holders filed agreements. The latter is expected to co-operate, but believed it unwise to sign an agreement because of litigation started by it in the federal court.

Aldermen now urge speed on the subway ordinance which, according to some, should have been considered concurrently with the indeterminate franchise. As the subways are to be built by special assessments, it will require a resolution of the board of local improvements, later passage of an ordinance by the City Council, then a confirmation in court of the assessment spread.

LATE NEWS

(*Continued from page 342*)

Sacramento, Cal.—Opposition to a proposal for state taxation of municipally owned public utilities is expressed in a brief filed with the joint legislative tax committee by N. Randall Ellis, the valuation and rate engineer for the city of San Francisco. Since the state law requires in most instances a two-thirds vote of the people to authorize bonds for the establishment, extension or improvement of publicly owned utilities, the brief says that it has at times been comparatively easy for groups with ulterior motives to muster an adverse one-third vote, with the express intention and result of embarrassing the publicly owned utility in its program of expansion.

◆

Niagara Falls, N. Y.—The City Council has granted a 25-year consent to the International Railway to operate a bus line in Hyde Park Boulevard and three other streets, the franchise to become effective as soon as the increased fares on local railway lines are approved by the Public Service Commission. A 10-cent fare will be charged on the proposed bus line with free transfers to city trolley lines.

◆

New York, N. Y.—The Board of Estimate is to consider plans for extending Riverside Drive and the elevated express highway northward across Harlem Ship Canal and into the Bronx, and eventually into Westchester County. Development costs are estimated at $100,000,000.

◆

Washington, D. C. — Promiscuous building of super-highways is shown to be ill-advised in a summary of traffic statistics dealing with highway planning issued by the American Road Builders' Association. Instead, the association finds need of greater activity over the entire net-work of the nation's roads, with all construction preceded by a careful survey of the present traffic facilities and its future requirements. Regional planning is urged for all centers of traffic density. Such planning would indicate whether present roadways should be reconstructed to great width, or whether the construction of more arterial highways over new routes would be more advisable.

◆

Richmond, Va.—Seven railroads have sought to intervene in the Interstate Commerce Commission's injunction proceeding against the Piedmont & Northern Railway to restrain it from extending its lines in North and South Carolina. The company is seeking to build a 55-mile extension from Spartanburg, S. C., to Gastonia, N. C., and a 76-mile extension from Charlotte to Winston-Salem, N. C.

◆

Boston, Mass.—For the nine months of the trustees' fiscal year ended March 31, 1930, Boston Elevated Railway was approximately $400,000 ahead of results for the corresponding period a year ago. The cost of service, which includes dividends, was $37,336 in excess of revenue for the nine months to March 31 this year whereas the excess cost of service in the similar nine months a year ago was $437,346. March produced excess revenue over cost of service of $178,957 compared with $245,409 in March, 1929. In every other one of the nine months, says the Boston News Bureau, the results this fiscal year were more favorable than in the corresponding month of the year before. In March, the road carried 31,196,207 passengers compared with 32,745,247 in March, 1929.

◆

Columbus, Ohio — Summer schedules for five street car routes of the Columbus Railway, Power & Light Company, call for reductions in the round-trip running time.

◆

Coronado, Cal.—Application for a 25-year franchise to operate buses here in place of street cars has been filed with the City Council by the San Diego Electric Railway. Attached to the application was a detailed plan of operation on a through schedule between Hotel del Coronado and Third and Broadway, San Diego.

◆

Philadelphia, Pa. — Joseph S. McCulloch, city representative on the board of the Philadelphia Rapid Transit Company, is charged with misappropriating $280,000 of the funds of the old Union Bank & Trust Company, when he was its president last year.

◆

Los Angeles, Cal.—The Pacific Electric Railway has been authorized by the California Railroad Commission to acquire from Pacific Transportation Securities, Inc., 871,284 shares of the capital stock of the Motor Transit Company, operating an extensive stage service in southern California.

◆

New York, N. Y.—More than 60,000 questionnaire postcards, addressed to Frank Hedley, president of the Interborough Rapid Transit, are being distributed to passengers on the Sixth Avenue elevated in an effort on the part of the Interborough to determine public sentiment on the proposal to condemn and remove this elevated line before work is started on the Sixth Avenue subway. The Interborough contends that immediate removal of the elevated structure on Sixth Avenue would dangerously overload both its Seventh Avenue and East Side subway lines.

DELEGATES AND GUESTS TO

A.E.R.A. Convention

SPECIAL train reservations are coming in to Association Headquarters daily. The "Family Party" idea has taken hold. With few exceptions every delegate is being accompanied by at least one member of the family.

Special train lists go to press June 2. If you intend using one of the special trains to the convention, send in your confirmation blank covering reservations secured for yourself and party on or before June 2, if you wish names shown in lists.

A.E.R.A. TRANSPORTATION COMMITTEE.

"Remember your date at the Golden Gate"

◆

Philadelphia, Pa.—The Pennsylvania Railroad has made available for the information of the public the lecture "Co-ordinated Transport," delivered before the economics class of Rutgers University on Feb. 21, 1930, by George Ogden, assistant vice-president of the Pennsylvania. It contains a complete exposition of the position of President Atterbury that the railroads must be ready to give the kind of service the American people want and that the railroads must consider themselves not railroads merely, but general transportation enterprises. The lecturer set forth the extent to which the Pennsylvania has put the plan into practice.

◆

Nashville, Tenn. — Each of the 400 trainmen of the Nashville Railway & Light Company wore a pink or a white carnation Mothers' Day. Tom Joy, Church Street florist, presented a huge box of flowers to J. P. W. Brown, vice-president of the company, who in turn distributed them among the men.

◆

Baltimore, Md.—A demand that the Maryland Public Service Commission act to abolish a 3-cent transfer charge between street car and bus, both operated by the United Railways & Electric Company, has been made upon the commission by the Park Heights Civic Improvement Association. The transfer charge is made between the buses on the Reistertown road and the street cars which continue to the center of the city. It is contended that those who use this system are required to pay a 13-cent fare. The association objected about a month ago and now demands that the commission take definite action.

◆

Butte, Mont.—Bonuses totaling nearly $1,200 will be distributed among trainmen of the Butte Electric Railway. The award is for excellent service and a record free of accidents for the period between Nov. 1 and May 1. The record during the last six months is the best that has been made in more than a decade.

◆

Detroit, Mich.—The experience of being removed on Wednesday, re-hired on Saturday, and the probability of being fired again has befallen Frank Couzens, son of the Senator. On May 14, Mr. Couzens resigned from the street railway commission at the request of Mayor Bowles, who charged that he had failed to co-operate with him and the other members of the commission. The Mayor and his family left May 16 for the Derby at Louisville, and the four ranking members of the City Council also left town. Councilman John S. Hall, a dentist, succeeded to the position of Acting Mayor over the week-end. His first act was to deliver to Mr. Couzens a letter informing him that he had been reappointed to the commission.

St. Louis, Mo.—Barney W. Frauenthal, general traffic agent for the St. Louis Public Service Company, has been re-elected secretary-treasurer of the St. Louis Railway Club.

Man Power Governs Quality and Cost of Bus Maintenance

With a varied and interesting program of papers and discussions covering maintenance matters, the regular semi-annual meeting of the Electric Railway Association of Equipment Men, Middle Atlantic States, was held at the Hotel Casey, Scranton, Pa., May 14 and 15. President W. H. McCarty conducted the meeting, which was attended by 65 railway delegates and "commercial ambassadors."

The problem of carbon brushes, their functions, inspection and care, was covered in a paper by W. Seibenmorgen, consulting engineer. The general discussion brought out much of interest in connection with this controversial subject.

The planning and lay-out of garage facilities and the organization and training of a bus maintenance and operating personnel were covered in a paper by A. E. Degen, technical service manager, General Motors Truck Company. According to Mr. Degan, poorly arranged storage space and make-shift methods have run up the maintenance expense charged against bus operation by railway operators, but more approved practices are coming into use as the real value of the bus as an ally to railway operation has become more generally appreciated.

The speaker also emphasized the importance of a well trained personnel in shop maintenance. "Man power," he said, "governs, to a great extent, not only the quality of maintenance, but also the cost. A good maintenance superintendent with the right kind of an organization can secure better results with a poor building and equipment than an inefficient one with the most modern and elaborate of maintenance stations." Discussion on this subject was led by J. R. McGorum, assistant master mechanic, Virginia Electric & Power Company, Norfolk, Va., and D. E. Frame, superintendent of equipment, Delaware Electric Power Company.

Question box discussion covered a wide range of subjects, including tire mileage, arc welding of wheel flanges, lamp life, and radio interference. In the matter of lamp life, E. L. Broe, of the General Electric Company, told of the experiments now being conducted at Nela Park laboratory with the view of developing a stronger filament for frosted globes. It was the opinion that the size of tires for buses should be determined by the tire manufacturer rather than the bus manufacturer, particularly where contracts with tire companies are written on a mileage basis.

That the electric railways are being blamed for much radio trouble for which other agencies are responsible was the concensus of opinion of the operators present. Radio frequency coils installed in the trolley circuits and non-arcing trolley wheels were suggested as remedies for much of the trouble reported, although careful tests will more often indicate that leaky transformers or industrial motors cause interference.

Delegates and visitors were guests of H. H. Dartt, president of the Scranton Railway, at a banquet on the evening of May 14. The following day they toured the company's shops.

Officers elected for the ensuing year were: President, D. E. Frame, superintendent of equipment, Delaware Electric Power Company, Wilmington, Del.; vice-president, J. T. Porter, superintendent of equipment, Virginia Electric & Power Company, Richmond, Va.; secretary-treasurer, R. D. Voshell, superintendent of equipment, Washington Railway & Electric Company, Washington, D. C. The next meeting of the association will be held at Norfolk, Va., at a date to be announced later.

An Unusual Traffic Survey in Washington

A traffic survey that promises to supply information of a type heretofore not obtained is being conducted in Washington by Miller McClintock, traffic engineer, under the auspices of the National Park and Planning Commission. While other traffic studies have fairly well established the modes of transportation used by shoppers, this survey will show the proportionate buying power of the various groups. It has been shown before that from 70 to 90 per cent of downtown shoppers (depending on the size of the town) travel to and from the stores in street cars and by other forms of mass transportation.

Since sales per customer are regarded by merchants as being just as important a factor as the total number of customers, the facts revealed in this connection may have an important bearing in determining the attitude of the storekeepers on parking.

Another feature of the survey will be an effort to record time consumed in parking. Tabulation will be made of the time elapsed until the feat of parking finally is accomplished.

Aerial photography has been brought into play so that the engineers may study the amount of downtown space used for parking. Studies also are being made of the off-street parking facilities. As another part of the survey, all of the government employees are being asked to indicate the form of transportation they employ in going to work. They will be asked where they park their cars, if they travel by this means, and whether or not they would be willing to pay a small fee for off-street parking.

Increase in Ticket Fare Asked in Omaha

The Omaha & Council Bluffs Street Railway Company on May 12 applied to the Nebraska State Railway Commission for an emergency order increasing fares in Omaha from three tokens for 20 cents to three for a quarter. The cash fare of 10 cents would remain unchanged, but the token fare would be increased from 6⅔ cents to 8⅓ cents. The commission has set May 21 as the date of a hearing.

According to President Shannahan, three things are responsible for the present emergency: a radical decline in business since the first of the year which has caused the revenue to be $1,100 a day less than 1929; the addition of 42 more miles of bus service which has increased expenses $175,000 a year, and an increase in wages which has added $65,000 a year.

The last valuation of the company's property made in 1919 was $14,100,000 and on a basis of 7 per cent return on this the company is entitled to $1,004,507 more than it is now earning, and even though the increase in fare be granted, Mr. Shannahan estimated that the company would still be short $396,819 of earning the fair return on its investment.

Until the Douglas Street Bridge was presented to the cities of Omaha and Council Bluffs under an arrangement whereby the cities will own the bridge in six and one-half years or less by using the tolls received to pay the stockholders of the bridge company $60,000 annually, to retire $60,000 of bridge company bonds, and to deposit at least $300,000 with the trustee of the railway bonds, the revenue received from the bridge tolls was used to make up the constantly increasing deficit in the company's revenue.

In his statement to the City Council, Mr. Shannahan pointed out that Omaha's present fare is below the general average and that the token fare of three for 25 cents is being charged in many of the large cities with even a higher fare being charged in other cities. The company said:

> In spite of constantly decreasing business and constant demands for extensions and additions to the service, Omaha's street car system has been maintained in 100 per cent condition so that our citizens can and do truthfully say that Omaha's street car system is as good as or better than any other in the country. Since 1920 we have spent for maintenance $2,904,268, and in that same period we have made actual additions to the property costing $1,159,370. In 1929 alone we spent nearly $500,000 for new buses and new power equipment, all for the benefit of the service.

New Control of Pedestrian Traffic in Effect in New York

Police Commissioner Whalen's proposals for the control of pedestrian traffic in New York City went into effect on May 19, in the form of additions to present traffic regulations. The first provision is that pedestrians shall cross the street only at a roadway or marked crosswalk; this is aimed at the jaywalker. The second provision is that at intersections where traffic is controlled by signals or officers, pedestrians shall cross the street only when vehicular traffic over the crossing in question is stopped, and that pedestrians so crossing the street shall have the right of way over all vehicles, including those making a turn. The third provision is that at intersections where traffic is not controlled by signals or officers pedestrians shall have the right of way over all vehicular traffic.

Receiver Would Sell Indiana Union Traction

Arthur W. Brady, receiver for the Union Traction Company, Anderson, Ind., has filed in Madison Circuit Court a petition asking for an order to settle accounts, determine liens and sell the property in receivership.

The receiver said that the transportation revenues declined about $125,000 from Jan. 1, 1930, to March 15, compared with the similar period last year. The receiver said that freight and express business were the only means of making good the losses and that $2,000,000 would be needed to improve this service.

Temporary Franchise Agreement in Akron Extended 19 Months

An agreement has been reached between the Northern Ohio Power & Light Company and the city of Akron to extend the city franchise for a period of 19 months from Sept. 1, 1930. The agreement was reached after a two-hour session between A. C. Blinn, vice-president and general manager, and the Council sitting as a committee as a whole.

In a statement to Council, Mr. Blinn pointed out that due to the prevailing industrial depression the franchise had not had a fair opportunity to show what could be done under it, and suggested that an extension be granted, based upon the prevailing rates of fare and under present provisions.

The present schedule provides for an 8-cent fare where exact change is provided, otherwise 10 cents; seven tokens are sold for 50 cents, and a book of sixteen tickets for $1. Express bus service at a fare of 10 cents is provided.

Akron newspapers were warm in their praise of the position taken by the company. "The public will approve the agreement between Council and the N. O. P. & L. Co.," declared the *Times-Press*. "As an experiment the current franchise has had but small opportunity."

The *Beacon Journal* said that "Manager Blinn and his company will make friends in Akron by their own fairness in the negotiations which led to the result." Continuing its editorial, the *Beacon Journal* declared that "the company had shown good sportmanship in making up its mind to go along without asking an increase in fare under present conditions."

The franchise under which the company is now operating became effective on May 26, 1929, and expires on Sept. 1, 1930. The idea was that a short-term contract at rates higher than those formerly in effect would furnish reliable data for a reasonably long term franchise.

Vaughan Tie Tamper Patent Upheld

Judge Hugh Morris of the United States District Court of Delaware in an opinion handed down on April 23, decided the suit of Fanny Minton Vaughan and the Ingersoll-Rand Company against the Gardner-Denver Company for infringement of the Vaughan tie tamper patent No. 1147660 in favor of the plaintiffs. The Ingersoll-Rand Company is the principal licensee under the patent.

Reorganization of Utah Line May Be Speeded

Reorganization of the Salt Lake & Utah Railroad and release from its present receivership may be possible at an earlier date than was expected, through action of the United States Supreme Court in denying the suit of the United States for precedence in claims against railroads which borrowed federal funds during and after the world war. D. P. Abercrombie, receiver for the railroad said that "assuming the government recognizes the Supreme Court decision as a precedent in the Salt Lake & Utah case, the situation should permit a reorganization at an early date."

The Supreme Court decision was made in the case of the United States vs. the Guarantee Trust Company, New York, acting as trustee of the bond issue of the Minneapolis & St. Louis Railroad. The government sought to enforce prior payment of a loan, similar to the $830,000 borrowed by the Salt Lake & Utah from a revolving fund established during the war for the benefit of the small railroads. The court held that the government, in making loans under this section, was engaged in business, and therefore entitled to no priority.

Supreme Court Upholds Lower Court's Decatur Decree

In the case of the Georgia Power Company, Atlanta, Ga., versus the city of Decatur a judgment of the Supreme Court of Georgia affirming a decree enjoining a street railway from violating an ordinance and a contract requiring it to carry passengers for a certain fare (in this case 5 cents) was affirmed by the United States Supreme Court on May 19. The railway contended that the rate was confiscatory and that the franchise and the rate contract had expired.

The State Supreme Court had held that the contract specifying the rate was still in effect, and the United States Supreme Court accepted the state court's construction of the statutes of the state and the ordinance and rate contract, and held that, inasmuch as the contract was still in effect, the street railway was not entitled to relief therefrom, although the company was losing money.

Competition Brings Protest at Duluth

An injunction is sought by the Duluth Street Railway, Duluth, Minn., to restrain the Gopher-Badger Bus Company from operating between 6 a.m. and 10 p.m. on Duluth streets having double street car tracks, except on condition that the buses do not stop to pick up or discharge passengers on West Third Street between Vernon and 38th Avenue West. The railway charges that the bus company has carried local passengers between the two points. It cites an ordinance passed by the City Council on June 16, 1924, giving the railway rights and privileges on all such streets.

The bus company points out that there have always been double tracks on the main thoroughfares leading from Superior to Duluth and that the Superior White Company, prior to its purchase in April, 1925, by the railway, operated despite the ordinance with no objection on the part of the electric railway. The answer also charges that the railway, which owns and operates the Duluth-Superior Coach Company, has had a monopoly on Twin-Ports transportation for many years and that the present action is intended to maintain and continue such monopoly.

Madison Company Demurs to Paving

The Madison Railways, Madison, Wis., has declared that it will incur no further liability for paving of track zones until it has paid its present obligation to the city. This is the reply to the city by the company in answer to the city's request that it prepare for permanent improvement of its right-of-way on Winnebago Street from the Yahara River to Second Street.

In a letter to city officials, the company says that it is not able to make the improvement at this time and suggests that the work be deferred until later. The city awarded the paving contract on Winnebago Street a year ago, but work was delayed until this year because the railway was not prepared to carry out its share of the improvement at that time. At the next Council meeting, city officials will decide whether to postpone work for another year, or proceed and charge the cost against the utility.

The Madison Railways has applied to the Railroad Commission for an increase in fares. Hearings on the application will begin June 9.

Columbia Case Decided

(*Continued from page* 312)

The company filed a petition for authority to discontinue service and for a hearing on the matter and the Railroad Commission, by a vote of four to three, allowed the company to discontinue service—or rather to let the service stay stopped.

Meanwhile the state attorney general asked for a rehearing. One member of the commission had died and another had been appointed in his place, and when it came to a vote on the motion to reverse its former ruling, the commission decided four to three so to do and the company was ordered to resume service. The attorney general petitioned to the State Supreme Court for a mandamus to compel the company to restore service. Various other steps were taken and finally the matter went to the United States Supreme Court.

Transportation has been an important issue in municipal politics. In the recent election of a Mayor and City Councilmen it came in for much discussion, even though at the time the issue was in the United States Supreme Court.

A bus company has been supplying more or less indifferent service since the street cars ceased to run, but due to the fact that the matter was in the courts, the company hesitated in making any heavy investment in equipment. Jitneys flourished for a time, but finally the City Council ruled them off the streets so that the bus company might get all the patronage.

Now citizens hope to see trolleys again on the streets. The tracks and the overhead are in place, but in need of repair. The carhouse is intact.

Taxi Cuts Seattle Revenue

Demand for action in the taxicab situation in Seattle, Wash., has been made on the City Council by Moritz Thomsen, who urged that Sam W. Taggart be permitted to control all taxicabs in the city for 25 years, in return for guaranteeing the city at least $500,000. With taxicab competition increasing, the $20,000 monthly loss now sustained by the municipal railway will be increased unless the city takes steps to control the taxicabs, Mr. Thomsen declared. Councilmen contend, however, that loss of revenue by the municipal railway results chiefly from reduction in service on the bus and car lines, and from increased use of private automobiles, rather than from competition by taxicabs. One councilman declares that "by reducing service, the railway is playing into the hands of the taxicab companies." Long waits for street cars and slow service are said to explain the falling off in railway revenue.

Move to Restrict Freight Service of Interurban

Whether the transition of a transportation activity induced by changing conditions produces rights which supercede the regulations imposed in a municipal franchise is a question which is expected to go before the Ohio courts. The question arises from a dispute between the Cincinnati & Lake Erie Railroad and Springfield property owners over the operation of freight trains on company lines. On April 14 developments pointed to an early attempt on the part of the property owners to obtain an injunction against the company, with the latter prepared to contest the suit to the limit.

Some weeks ago the property owners on streets traversed by the company's lines asked the City Commission to enforce the terms of the franchise ordinance, which limits freight operation. When the franchise was granted a score of years ago, the passenger business furnished the bulk of the income and with little freight business except light express and milk. Today, through freight service in regular freight cars has become a common practice.

Springfield is the hub of the Cincinnati & Lake Erie lines. Hence the reason for the company's extra interest in the local situation. Following receipt of the petition from property owners, the commission instructed the railroad to obey the terms of the ordinance. However, twenty large industrial concerns have protested enforcement of the ordinance, and beyond the gesture, the commission is expected to take no further steps in the matter. But property owners declare they are prepared to go into the courts to seek an injunction. Meantime, the freight service continues.

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Rate War Among Springfield Taxis

Taxicab companies in Springfield, Mass., have started a rate war. The Aldermen established a minimum rate for metered cabs of 35 cents for the first third of a mile and 10 cents for each additional third of a mile. One company ignored the order and operated its cabs at 20 cents for the first quarter mile and 5 cents for each additional quarter to test the legality of the municipal ruling. The city solicitor advised against taking away the license of the offending company, being doubtful as to the city's powers. Other companies then began carrying passengers anywhere in the city for 50 cents. As the latest step the Aldermen have adopted a new minimum rate for metered cabs of 25 cents for the first quarter mile and 5 cents for each additional quarter mile. The zone rates for unmetered cabs have been reduced to a 50-cent fare for one or two passengers and 25 cents for each additional passenger in the first zone, with 25-cent advances in the second and third zones, respectively.

Conspectus of Indexes for May, 1930

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years	
				High	Low
Street Railway Fares* 1913 = 4.84	May, 1930 **7.96**	April, 1930 **7.91**	May, 1929 **7.76**	May, 1930 **7.96**	May, 1925 **7.27**
Electric Railway Materials* 1913 = 100	May, 1930 **139.9**	April, 1930 **140.2**	May, 1929 **145.5**	Dec., 1926 **159.2**	Feb., 1928 **139.5**
Electric Railway Wages* 1913 = 100	May, 1930 **231.7**	April, 1930 **231.7**	May, 1929 **230.1**	April, 1930 **231.7**	May, 1925 **222.2**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	May, 1930 **201.1**	April, 1930 **203.0**	May, 1929 **199.5**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	April, 1930 **205.9**	April, 1930 **207.1**	May, 1929 **205.2**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	April, 1930 **90.7**	Mar., 1930 **90.8**	April, 1929 **96.8**	Nov., 1925 **104.5**	April, 1930 **90.7**
Wholesale Commodities Bradstreet 1913 = 9.21	May, 1930 **10.94**	April, 1930 **11.18**	May, 1929 **12.68**	Dec., 1925 **14.41**	May, 1930 **10.94**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	April, 1930 **151.2**	Mar., 1930 **150.1**	April, 1929 **151.6**	Nov., 1925 **167.1**	Mar., 1930 **150.1**
Cost of Living Nat. Ind. Conf. Board 1914 = 100	April, 1930 **157.5**	Mar., 1930 **157.4**	April, 1929 **159.3**	Nov., 1925 **171.8**	Mar., 1930 **157.4**
Industrial Activity Elec. World, kw.-hr. used 1913-25 = 100	April, 1930 **120.2**	Mar., 1930 **120.3**	April, 1929 **136.4**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	April, 1930 **93.4**	Mar., 1930 **94.3**	April, 1929 **104.0**	Oct., 1929 **111.8**	April, 1930 **93.4**
Business Failures Number Liabilities, Millions of Dollars	April, 1930 1976 **80.71**	Mar., 1930 2093 **73.82**	April, 1929 1735 **38.11**	July, 1929 1581 **102.09**	Sept., 1928 1348 **23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

City After Local Detroit Buses

Detroit's City Council has refused to approve the contract made by the Street Railway Commission for the purchase of fifty 40-passenger buses. Action has been postponed for at least 30 days. The Council voted to defer the purchase pending the outcome of negotiations between the Department of Street Railways and the Detroit Motor Bus Company for taking over the company's lines for articulation with the city system.

Council members desire to know where buses would be used, and the commission was asked by the Council for a progress report on its negotiations with the bus company. When the bus purchase was first authorized by the commission, Frank Couzens, then a commissioner, asked if the purchase was necessary in view of the probable taking of equipment from the private company. President Barlum, of the commission, said the new equipment would be needed whether or not the bus company equipment was taken over by the city.

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Northern Ohio Withdraws from Operating Canton City Lines

After months of negotiations an agreement has finally been reached in the Canton, Ohio, transportation situation. Two companies, one the Canton Traction Company and the other the Canton Motor Coach Company, are to supply the city with transportation. The Canton Traction Company takes over part of the lines formerly operated by the Northern Ohio Power & Light Company. The agreement provides for an exchange of free transfer between the two companies. The fare is to be 7 cents cash, eight tickets for 50 cents, with a 5-cent school ticket.

The Oxford Avenue, the Mahoning Road, and the Bryan Avenue lines operated by Northern Ohio Power & Light Company are abandoned under the arrangement. Two tracks are to be taken off the Public Square and the loop known as the Cleveland Avenue-Fifth Street-Tuscarawas loop used by Stark Electric Company's interurban cars is abandoned. The Stark Electric cars will turn from Cleveland into Tuscarawas and then back to the Square.

In lieu of the Northern Ohio Power & Light Company being required to remove its abandoned tracks, the city is to receive a lump sum of $100,000. Bus service by the Canton Motor Coach Company is to supplant the abandoned lines and the Coach Company is to cease operating buses parallel to the East Tuscarawas line, which is to be operated by the Canton Traction Company. Other lines to be operated by the Traction Company are the Navarre-Garfield Avenue, Lake line, and the West Tuscarawas line. Suburban service from the Public Square of Canton to the Public Square of Massillon is to continue. Whether this suburban line will be taken over by the Canton Traction Company is a matter yet to be determined.

The Canton Traction Company is made up largely by Canton men and is not a subsidiary of the Northern Ohio Power & Light Company, being en- Ohio Power therefore withdraws from the Canton city transportation field.

PERSONAL MENTION

New Cleveland Men in Office

Brief Accounts of the Careers of the Representatives of the Van Sweringens Recently Elected to Executive Posts With the Cleveland Railway

ON APRIL 24 Paul Wilson, vice-president and treasurer of the Cleveland Railway, Ralph W. Emerson, vice-president and general manager, and Charles H. Stanley resigned as directors of the railway. In their places the following were elected: Charles L. Bradley, who was also made chairman of the board, Alva Bradley and Otto Miller. In addition, George D. McGwinn was made vice-president of the company. These changes were brought about by the desire of Messrs. O. P. and M. J. Van Sweringen, who control the Cleveland Railway through Metropolitan Utilities, Inc., to have active representation on the board and in the executive operating staff of the company.

Charles L. Bradley is rated as the closest business associate of O. P. and M. J. Van Sweringen. He has been closely identified with Van Sweringen enterprises since July 24, 1927, when he became president of the Cleveland Union Terminals Company.

Mr. Bradley and his brother, Alva R. Bradley, are members of an old and wealthy Cleveland family. Their grandfather was Capt. Alva Bradley, who sailed the Great Lakes and made a fortune in the shipping business. Their father, M. A. Bradley, put the money to work in downtown Cleveland real estate, large parcels of which are still owned by the Bradley estate.

Both Charles and Alva Bradley were graduated from Cornell University.

Charles Bradley attracted attention during the war as head of the Cleveland liberty loan organization—during the third, fourth and fifth campaigns. In 1919 he was made vice-president of the Union Commerce National Bank. When the Union Trust merger was completed he was made vice-president and later general manager of that company.

In 1927 the Van Sweringens asked him to take over the job of completing the Cleveland union terminal and he succeeded O. P. Van Sweringen as president of the Cleveland Union Terminals Company. On April 26, 1929, he was made chairman of the board of the Erie Railroad, which is controlled by the Van Sweringens. Also, in 1928, he headed a syndicate which acquired control of the Midland Bank. This bank will move shortly to a new building in the Van Sweringen terminal area. He is also a director of a number of other companies, including the Cleveland Hotel Corporation, Cleveland Traction Terminals Company, Otis Steel Company, White Motor Company, and Hupp Motor Car Corporation.

Alva Bradley is best known at this time in Cleveland as president of the Cleveland Baseball Club. Charles Bradley is also a director of the club. Alva Bradley was a director of the Cleveland Trust Company for ten years. He resigned in 1928 to become associated with his brother as a director of the Midland Bank. He is also a director of the Chesapeake & Ohio Railroad, chairman of the board of the Cleveland Builders Supply & Brick Company, and chairman of the Cleveland & Buffalo Transit Company. In 1929 he was president of the Cleveland National Air Race & Show Corporation under whose auspices the national air races were conducted.

At top, C. L. Bradley
At left, G. D. McGwinn
At right, Alva Bradley
At bottom, Col. Otto Miller

George D. McGwinn comes into electric railway operation through the channels of building management and construction. Mr. McGwinn was a specialist in building management. Among the structures of which he was in charge were the Citizens and the Union Commerce National Bank buildings. When the Union Trust merger was brought about, Mr. McGwinn was confronted with the problem of housing the forces of four banks in a building that was considered too small for one. He managed it for three years, while the Union Trust building was under construction, and then was made vice-president and building manager of the Union Trust Company.

When Charles Bradley left the Union Trust Company to become president of the Cleveland Union Terminals Company, he took Mr. McGwinn with him as vice-president of the terminals company.

The two became known as the team of Bradley and McGwinn. As expert "trouble shooters" they proceeded to mop up one difficulty after another that confronted them in the completion of the mammoth terminal project.

Upon becoming vice-president of the Cleveland Railway, Mr. McGwinn resigned as vice-president of the terminals company, which was considered a pretty good indication that most of the difficulties in the way of the completion of the terminal were solved.

Otto Miller is a partner in Hayden & Miller & Company, which he founded in 1903 with Warren S. Hayden. As an investment banker he has participated in the sale of numerous Van Sweringen security issues and has been a director in a number of companies they control, including the Chesapeake & Ohio and Hocking Valley railroads. Mr. Miller is a veteran of the Spanish-American War. He was a member of the governor's staff for many years and a captain in Troop A, exclusive social and military cavalry organization in Cleveland. In 1928 he was elected president of the Western Reserve Historical Society.

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Harry A. Osgood Master Mechanic at Binghamton

Harry A. Osgood has recently been appointed master mechanic of the Triple Cities Traction Company, Binghamton, N. Y., to succeed Frank Hampshire, who has been with the company for 23 years, the last eight years as master mechanic.

Mr. Osgood comes from the Massachusetts Northeastern Street Railway, operating in Amesbury, Haverhill, Lawrence, Newburyport and Saulsbury, Mass., and Salem, N. H.

Mr. Osgood started his railway career with the Massachusetts company in 1907 and has been master mechanic for the past ten years. His home was at Salem, N. H., where he has been active in local affairs, serving as chairman of the board of trustees of the First Congregational Church, member of the board of water commission, director in a local bank and member of the New England Street Railway Club. He is a Shriner.

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Col. A. T. Perkins Honored

Members of the 327th and 359th Engineers and the Society of American Military Engineers held a special meeting on the snagboat *John Macomb* the night of April 29 to honor Col. Albert T. Perkins, vice-president of the City Utilities Company, St. Louis, who recently was placed in the auxiliary reserve of the United States Army and automatically relieved of the post of commanding officer of the 327th Engineers of the 102nd Division. Col. H. Austill, who succeeded Col. Perkins as commander, made the principal address. On behalf of the engineers he presented Col. Perkins a loving cup as a remembrance. In making his response, Col. Perkins stressed the need for national defense and an organized reserve corps.

Messrs. Vandeveer, Barkey and Lathrop in Detroit Changes

Recent changes in the personnel of the Department of Street Railways at Detroit, Mich., include the removal of Arthur L. Barkey, claims attorney for the department, and the resignation of Rufus G. Lathrop, secretary to the commission.

Mr. Lathrop has served the commission since 1925. In accepting his resignation the commission voted unanimously to write a vote of confidence in Mr. Lathrop into the records of the commission. His successor has not been named.

Mr. Barkey will return to his old position as assistant corporation counsel and the former position of claims attorney will not be filled. A new position, to be known as general trial attorney for the Department of Street Railways, has been created and to it Fred L. Vandeveer has been appointed. Mr. Vandeveer has been head of the claims department of the Travelers' Insurance Company for 27 years and his new appointment was made upon motion of Commissioner Dohany, recently appointed a committee of one to investigate the D.S.R. claims division. The new position will be under control of the D.S.R., and separate from the Corporation Counsel's office.

Glenn C. Spink, who served in Mayor Bowles' campaign headquarters during the last election, has been named employment manager of the Department of Street Railways, at Detroit, Mich.

Mr. Spink succeeds Joseph A. Burman. Wesley C. Stephens was the first man to replace Mr. Burman. Mr. Stephens was on the job 72 hours when the mayor ordered Mr. Burman, one of the veterans of the organization, to be restored.

✦

A. Le Roy Hodges, formerly manager of the Brockton division of the Eastern Massachusetts Street Railway, has been appointed manager of the Boston, Worcester & New York Street Railway, operating an extensive system of railway and bus lines, with service by bus reaching from Massachusetts towns to New York. Mr. Hodges' railway experience dates back to 1908 with the Westchester, Kennett & Wilmington Railway at Kennett Square, Pa., and covers service on other properties in the East and in the Middle West, notably in the post of assistant general manager of the Brooklyn City Railroad.

✦

R. A. Gallagher has been appointed comptroller of the Central Public Service Corporation, Chicago, Ill. He will have jurisdiction over the accounting of all properties in the Central Public Service Corporation group, which operates in 471 communities of the United States and in two provinces of Canada.

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John R. Marsh Advanced at Atlanta

"P. S. Arkwright, president, announces the appointment of John R. Marsh, formerly assistant manager, as manager, public relations department, Georgia Power Company, succeeding L. K. Starr, resigned."

John R. Marsh

That was all there was to the formal card issued recently to those who might be interested, about the advancement to one of the most important posts of its kind in the utility field of one of the ablest and youngest of the men engaged in this particular form of activity.

John R. Marsh has worlds of experience that qualifies him technically for the new post, but more than that he has innate and cultivated attributes of inestimable value to the incumbent of a position such as his. These have been unmistakably reflected in his work on *Two Bells,* distributed to patrons of the railway, and on the company's publication intended for distribution among the employees. Not only does he write well, but there is that divine touch about what he does which reflects the milk of human kindness that enables him to clothe a fact in garments of fancy. That, of course, is art. And John R. Marsh is an artist.

Biographically speaking, Mr. Marsh was born in Maysville, Ky., on Oct. 6, 1895. He was graduated from University of Kentucky, at Lexington, with the degree of A.B. in 1916. He worked as reporter on newspapers in Lexington, Ky., following his graduation, and served over seas during the World War. He moved to Atlanta in 1920 and worked as reporter on the *Atlanta Georgian.* That post he resigned in April, 1922, to take a position with the public relations department of the Georgia Power Company, but left the company after a few months to re-enter newspaper work, serving with the *Atlanta Journal* and with the Associated Press in Atlanta and Washington. He returned to the Georgia Power Company in September, 1924, and shortly thereafter was appointed assistant manager, public relations department, serving in this capacity until appointed manager of the public relations department on May 9, 1930.

Charles O. Birney, Car Designer, Retires After Thirty Years

Charles O. Birney has resigned from the Stone & Webster organization. After thirty years of constructive labor in the electric railway business, Mr. Birney has decided to allow himself more leisure for those pursuits which his very active life has hitherto denied to him.

It was in 1906, the year Mr. Birney was made a member of the Stone & Webster division as a car inspector, that he found real scope for his constructive powers. In 1909 he designed the continuous "T" post and continuous sash type of car, a radical departure from the standard type, so much so, indeed, that it was difficult to persuade the car builders to undertake the first order, which was for the Jacksonville Traction Company. This type has now become widely used.

When jitneys became serious competitors of electric railways in 1915, it was Mr. Birney who relieved the situation by designing the one-man safety car, which is now universally associated with his name. Like all drastic innovations, this one was received doubtfully at first, but the responsible operating executives of Stone & Webster were confident of the possibilities of the new car, and their confidence was justified. It is estimated that this method of construction and operation today is saving the electric railway industry more than $30,000,000 a year. From that time until the present, Mr. Birney has worked to improve methods of car construction and operation.

Charles O. Birney

Charles O. Birney was born about 63 years ago. He began his business career at the age of nine. For the next fifteen years Mr. Birney was engaged in steam road car building. In December of 1899 he accepted a job as a car builder with the Seattle Electric Company in its Seattle plant. At this time, he says, he had a wife, two children, and just $2 capital. He had to borrow his tools, for his own equipment consisted of a pocket knife, a 10-cent rule, and a pencil. His wages were $2.50 a day, and he worked ten hours.

Within ten days Mr. Birney had received two raises, in six months he took over all the pattern work, and in another six months he had become foreman of all the woodworking departments. By the end of another year he was general foreman of the entire mechanical department. In March, 1906, he was sent to St. Louis to superintend the building of 25 cars for the Seattle Electric Company, and while there he took charge of other cars being constructed for various companies under Stone & Webster management. The same year Mr. Birney was made a member of the Stone & Webster engineering division as car inspector. As stated previously it was in this position he found scope for his constructive powers.

Indianapolis Company Under G. C. Forrey, Jr., Receiver

George C. Forrey, Jr., recently appointed receiver of the Indianapolis Street Railway, is president of the Fletcher American Company, Indianapolis, and first vice-president of the Fletcher American National Bank.

His long career as an Indiana investment banker has brought him into close touch with the electric railway lines of the state and their financial problems. For a number of years, he has been a director of the Terre Haute, Indianapolis & Eastern Traction Company, and two of its leased properties, the Terre Haute Traction & Light Company and the Indianapolis & Northwestern Traction Company.

Mr. Forrey was born in Anderson, Ind. He attended Culver Military Academy and Williams College at Williamstown, Mass., (A.B. 1903). After leaving college, he became connected with the Anderson branch of the investment securities firm of Breed, Elliott & Harrison. Seven years later, he went to Indianapolis as vice-president of the same organization, a position which he held for eight years.

George C. Forrey, Jr.

When the Fletcher American Company was organized in 1920, Mr. Forrey was appointed vice-president and general manager and in 1923 was elected president of the company as well as vice-president and director of the Fletcher American National Bank.

In addition to occupying these offices, he is president of the Belmont State Bank of Indianapolis, chairman of the executive committee of Indianapolis Abattoir, Inc., and a director of several other important local industrial institutions.

Mr. Forrey is a member of the Indiana Bankers' Association, Indianapolis Athletic Club, Columbia Club and various fraternal orders.

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T. P. Pfeiffer Advertising Manager

T. P. Pfeiffer has been appointed advertising manager of the Byllesby Engineering & Management Corporation and the Standard Gas & Electric Company, Chicago.

J. W. Hicks has been appointed publicity director of the Byllesby Engineering & Management Corporation and Standard Gas & Electric Company, also remaining in charge of the publications of these companies issued for executives and employees.

D. Ernest Frame

Delaware Executive Heads Middle Atlantic Equipment Men

D. Ernest Frame, elected president of the Electric Railway Association of Equipment Men, Middle Atlantic States, at the meeting in Scranton, May 14-15, is superintendent of equipment of the Delaware Electric Power Company, Wilmington, Del. Mr. Frame's experience has not been so wide in the sense of the number of properties on which he has served, as it has been thorough and intensive. He is a product of the apprenticeship system, having served his time in the Baldwin Locomotive Works as a machinist. In 1909 he was appointed a repairman with the Philadelphia Rapid Transit Company. Four years later he was appointed foreman of the company and in 1916 was appointed district superintendent of car maintenance of the company. This position of district superintendent he resigned in 1921. For the year 1922 he was superintendent of the West Chester Street Railway. In 1923 he was appointed foreman of the Delaware Electric Power Company and in 1924 was appointed superintendent of equipment of the company, successor to the Wilmington & Philadelphia Traction Company.

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L. C. Whitney with Copperweld

Leslie C. Whitney has joined the mill organization of the Copperweld Steel Company, Glassport, Pa., as chief metallurgist. Mr. Whitney was graduated from Lehigh University in 1922 as metallurgical engineer. For the past five years, he has been employed as assistant head of the physical laboratories for one of the largest wire manufacturers in the country. His work there covered all phases of round and flat wire production, open-hearth, rolling, drawing, and fabrication of wire products. Mr. Whitney is now supervising the installation of equipment in the Copperweld Steel Company's new research laboratory. This laboratory will combine the chemical, metallurgical, mechanical testing, and heat treating laboratories. The latest type of testing equipment is being installed throughout.

L. C. Whitney

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E. W. Stout Railway Receiver

Elmer W. Stout, appointed receiver of the Terre Haute, Indianapolis & Eastern Traction Company, is president of the Fletcher American National Bank, Indianapolis, the largest financial institution in Indiana and depository for several T.H.I. & E. security holders' committees. He also holds the position of vice-president of the affiliated Fletcher American Company.

Elmer W. Stout

Mr. Stout is a native of Indianapolis. He was graduated from Earlham College (Richmond, Ind.) in 1897 and from the Harvard Law School three years later. He practiced law in his home city from 1901 to 1916, during which time he acted as local attorney for the Indianapolis Water Company and several steam railroads and express companies. While attorney for the City Park Board, from 1908 to 1914, he drafted the park development program upon which the outstanding public park and boulevard system of the city of Indianapolis is founded.

His extensive legal and financial experience includes two years (1911 and 1912) as federal court receiver of the Ford, Johnson Company, Michigan City, Ind., former manufacturers of chairs and car seats.

In 1916, Mr. Stout was elected vice-president and general counsel of the Fletcher American National Bank and seven years later, in 1923, became its president. Simultaneously, he was named vice-president of the Fletcher American Company, an associated investment securities concern. In the seven years Mr. Stout has been chief executive of the bank, its deposits have more than doubled.

Mr. Stout is president of the Indiana Bankers Association and member of the Marion County and state bar associations, besides numerous Indianapolis clubs.

Departmental Activities Changed by Eastern Massachusetts

Because of the great increase in volume of work made necessary by the highly competitive nature of the transportation business, and also on account of the company's own entrance into the bus and motor coach field, it has been decided to readjust departmental activities in the Boston office of the Eastern Massachusetts Street Railway.

Effective May 15, Vice-President F. A. Cummings was assigned charge of public relations, advertising, relations between company and organized labor, and similar work as special representative of the company.

M. E. McCormick, manager of the Chelsea and Melrose-Woburn districts, has become general superintendent of transportation with headquarters in the Boston office in charge of the transportation department, reporting to A. J. Boardman, vice-president and general manager.

Albert E. Myers, superintendent of the Chelsea Division, has become manager of the Chelsea and Melrose-Woburn Divisions.

The record of Mr. Cummings with the company is well known. His work has been outstanding, best instanced, perhaps, in the extended biographies of him which were published in the issues of ELECTRIC RAILWAY JOURNAL for Oct. 25, 1924, and Sept. 15, 1923.

For the past six years Mr. McCormick has been manager of the Chelsea and the Melrose-Woburn Divisions and previously was manager of the Quincy, Salem and Lowell Divisions respectively. He worked his way up from the ranks at Bangor, Maine, where he was first employed by a street railway in 1896. He has held numerous executive positions in the mechanical and transportation departments and is thoroughly familiar with the street railway business.

After two years' service as manager of the New Brunswick Power Company at St. John, N. B., he went with the Eastern Massachusetts Street Railway in 1919, shortly after the public trustees took control of the road, and was assigned to manage the Quincy Division, from which he was promoted successively to the Salem, Lowell and Chelsea districts.

Albert E. Myers, who is succeeding Mr. McCormick as manager of the Chelsea and Melrose-Woburn Divisions, has been superintendent of the Chelsea Division for fifteen years. Prior to that time he was starter in Merrimack Square, Lowell.

William H. Giles, who was recently appointed superintendent of the Melrose-Woburn Division, will continue in the same capacity under supervision of Mr. Myers.

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H. R. Horton Superintendent of Instruction at St. Louis

H. R. Horton has entered the service of the St. Louis Public Service Company, St. Louis, Mo., as superintendent of instruction reporting direct to A. J. Fink, director of transportation. Mr. Horton was graduated from the University of Arkansas in 1916 with the degree of B.E.E. He immediately entered upon the graduate student course of the Westinghouse Electric & Manufacturing Company at Pittsburgh, Pa., and in 1917 became an engineer in the mechanical parts section of the railway engineering department, handling the designs of electric locomotives for mine and industrial work and for main steam road electrification. He was engaged on the pioneering work in the design and application of helical gearing, now in common use on street cars.

In 1927 he entered the employ of the Pittsburgh Railways as mechanical engineer in the instruction bureau, and on Jan. 1, 1930, became superintendent of instruction, reporting directly to Mr. Cooke, general superintendent of traffic and transportation. From that company he went to St. Louis. Mr. Horton was a member of the A.E.R.A. Committee on Employee Relations the past year, and also a member of the T. & T. Association committee The Employee, reflecting his keen interest in these subjects.

R. E. Plimpton, associate editor of *Bus Transportation*, a McGraw-Hill Publication, and a member of the editorial staff since the publication was established in 1922, has resigned, effective May 1, to assume a new position with the White Company, Cleveland, Ohio. For the past few years, Mr. Plimpton has represented *Bus Transportation* in the West with headquarters in Chicago. With the White Company, he will be in the sales promotion division as transportation engineer, conducting special investigations of bus operations.

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F. O. Whiteman has been appointed assistant general superintendent of the Chicago, South Shore & South Bend Railroad, South Bend, Ind., succeeding S. A. Morrison. Mr. Whiteman was formerly superintendent of service of the East St. Louis & Suburban Railway, East St. Louis, Ill.

Burton W. Marsh in Philadelphia Post Similar to His Pittsburgh Position

Burton W. Marsh

Burton W. Marsh, who was appointed as the first full-time municipal traffic engineer in the country more than five years ago by the city of Pittsburgh, became traffic engineer for Philadelphia on May 1. Through the improvements he has effected in the traffic situation at Pittsburgh and through his connection with many national committees, Mr. Marsh has become well known in the field of traffic safety engineering. The position of traffic engineer for Philadelphia was created in the 1930 budget, and comes under the administration of the department of public safety, of which Lemuel B. Schofield is director.

A downtown traffic survey, said to have been one of the most complete ever carried out as the basis for the consideration of installing a traffic signal system, was one of the steps taken by Mr. Marsh as traffic engineer of Pittsburgh. He was also influential in bringing about the establishment of the Pittsburgh Better Traffic Committee. This organization, appointed by the Mayor, is composed of business and professional leaders and city officials who are most closely concerned with street traffic problems. Mr. Marsh held the position of traffic engineer for this body, as well as for the city.

Upon the recommendation of Mr. Marsh, the Bureau of Traffic Planning was formed soon after he accepted the Pittsburgh position. This municipal department has continued to grow in personnel as well as in the appropriations made for it. For 1930, the City Council approved the expenditure of $253,400 for the bureau and its advisory body, the Better Traffic Committee. This sum is to be used for such undertakings as the erection of new traffic control equipment, signs, markings and the like, as well as to cover the salaries of the personnel. It also includes $17,500 for educational work.

Mr. Marsh was actively in charge of the design, installation and operation of the flexible progressive signal system covering 89 intersections in downtown Pittsburgh. This comprises the largest single progressive control signal system in the country. Pittsburgh's through highway system, made "fool proof" through the use of attention-compelling, flashing Neon "Stop—Through Traffic" signs, was started by Mr. Marsh last February. He was also responsible for carrying out yearly city-wide traffic counts and for starting continuous, intensive analyses of traffic accidents and development of suitable remedial measures.

Mr. Marsh is a graduate of Worcester Polytechnic Institute. Following his graduation, he attended Yale as a postgraduate student for one year. Prior to becoming traffic engineer in Pittsburgh, he was engaged for three years in municipal consulting engineering work covering traffic studies, city planning and zoning.

Mr. Marsh is vice-chairman of the engineering committee of the National Safety Council and is chairman of the program committee of the street and highway section of the National Safety Congress for 1930. He is a member of the model municipal traffic ordinance committee and several other sub-groups of the National Conference on Street and Highway Safety. He also holds memberships in the committee on standardization of traffic signs, signals and markings of the American Engineering Council, the traffic committee of the National Research Council, the traffic committee of the American Road Builders' Association, and the American City Planning Institute.

Samuel Riddle Resigns as Vice-President at Louisville

Samuel Riddle, vice-president and secretary of the Louisville Railway, Louisville, Ky., will retire from the organization on Aug. 1. Mr. Riddle went to Louisville in 1910 from the Philadelphia Rapid Transit Company to take charge of the transportation department, as superintendent of transportation, under T. J. Minary, then president.

In 1920, James P. Barnes went to Louisville as president from Schenectady, and Mr. Riddle became vice-president in charge of transportation. In 1928 he was also made secretary.

Mr. Riddle is a native of Pennsylvania. He was graduated from the engineering department of Swartmore. From 1901 to 1903 he was with the United Gas Improvement Company, and then with the transportation department of the United Electric Railways, Providence, R. I. From 1907 to 1909 he was general manager of the Chicago, South Bend & Northern Indiana Railway. He next went to Philadelphia. He is serving this year as president of the American Electric Railway Transportation and Traffic Association. He has not announced his future plans.

Samuel Riddle

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L. K. Starr Resigns from Georgia Power Company

Linton K. Starr has resigned as manager of the public relations department of the Georgia Power Company, Atlanta, Ga., on account of ill health.

In 1921, Mr. Starr resigned as assistant city editor of the *Atlanta Journal* to become executive secretary of the newly formed Georgia Committee on Public Utility Information. In that post he directed the committee's activities, particularly the development of friendlier relationship between the public and corporations serving it by acquainting the one with the problems and purposes of the other. Subsequently he became connected with the Georgia Power Company. To both these posts Mr. Starr brought the advantage of a wide experience, not only in the newspaper profession, but in publicity and public relations work of all kinds. A native Georgian, a graduate of Emory University and a former student of Johns Hopkins University, he has lived practically all his life in Georgia and has been familiar from boyhood with the state and its people.

During the war Mr. Starr conducted an extensive campaign for the government to arouse interest in and encourage the support of the selective service law in Georgia. His other work has included publicity for Emory University, various conventions and a number of business enterprises. He is an experienced advertising writer.

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E. F. Thayer with St. Louis Public Service Company

Edwin F. Thayer, formerly with the Philadelphia Rapid Transit Company, Philadelphia, Pa., has become associated with the St. Louis Public Service Company, St. Louis, Mo., as a member of the executive staff with special duties assigned to him from time to time. Mr. Thayer went with the Philadelphia Rapid Transit Company in January, 1927, to become associated with J. M. Shaw, in charge of the public relations activities of the company. Since April, 1929, he has been new-business director of Mitten Men & Management Bank & Trust Company, and Mitten Bank Securities Corporation, Philadelphia. Before going to Philadelphia, he was a member of the editorial staff of ELECTRIC RAILWAY JOURNAL for two years with the title of assistant editor. He is by profession an engineer, having been graduated from the California Institute of Technology with the degree of B.S., in engineering and economics. Aside from serving more than a year in engineering and contracting work, Mr. Thayer's activities have all been in the field of the daily newspaper and the trade journal and in public relations. He was born in Newton, Mass., on May 7, 1901.

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London Delegation to Attend San Francisco Meeting

Four members of the London Companies, of which Lord Ashfield is chairman, will attend the A.E.R.A. convention in San Francisco this June. On the return trip, the party will visit the transport companies at Los Angeles, Salt Lake City, Denver, Omaha, Kansas City, St. Louis, Chicago, Detroit, Cleveland, Pittsburgh, Buffalo, Albany, Newark, Philadelphia, Baltimore, Washington, Boston and New York. The members of the party are:

George Shave, operating manager and chief engineer, London General Omnibus Company.

J. H. Williams, divisional engineer, London General Omnibus Company.

A. A. M. Durrant, assistant superintendent rolling stock, London General Omnibus Company.

L. B. Hewitt, mechanical engineer, Metropolitan Electric Tramways, Ltd.

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Henry Mozley, general manager of Burnley, England, tramways and buses, has retired after more than 60 years' service with transport undertakings. He has been manager of the Burnley tramways since 1882. He was president of Municipal Tramways Association in 1916-17 and has long been a member of the executive council of that body.

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S. J. Peterson, Omaha, Neb., formerly general claim agent for the Union Pacific Railroad, has joined the legal department of the Kansas City Public Service Company, Kansas City, Mo. Mr. Peterson was with the Union Pacific for 40 years.

"Journal" Editors Win Two Business Paper Awards

It is with pride that ELECTRIC RAILWAY JOURNAL records the accomplishments of two of its staff, George J. MacMurray, news editor, and Morris Buck, engineering editor, in winning two of the 1930 Associated Business Papers awards. Mr. MacMurray won the second award for the best editorial and Mr. Buck scored second place for the best article, series of articles or news report. First places in these two classes were won by Samuel O. Dunn, editor *Railway Age,* and Robert L. Davison, *Architectural Record.*

The objective of the A.B.P. awards is to provide recognition of outstanding excellence of business paper editorial work. It is believed the awards so dramatize editorial services that both the editors and their readers gain a wider understanding of the place and purpose of the business press in its relation to industry, trade, commerce, professional activities and specialized services.

Mr. MacMurray's editorial "The Subsidiary as a New Shibboleth," appearing in the Feb. 16, 1929, issue of ELECTRIC RAILWAY JOURNAL, dealt with the matter of political meddling through the advocacy by those outside of the industry of a subsidy as a way out for the railways, and stressed the need on the part of the railways for devising a schedule of fares that would be compensatory and yet not drive away riding. The basis for the judgment of this award was the importance of the subject, clearness of style, sound reasoning and power of influence.

Mr. Buck's series of three articles, starting with the one in May entitled "New Car Survey Shows Increased Net on Many Properties," was a survey showing how the purchase and operation of new cars had materially improved the financial status of 41 railway properties. Statistics were collected and elaborate tables and charts were presented showing the results that have been obtained before and after the introduction of new cars on these railway systems. These articles appeared in the issues of ELECTRIC RAILWAY JOURNAL for May, June and July, 1929. The awards in this class were based on timeliness, accuracy, thoroughness, originality, clearness of expression and usefulness.

◆

James J. Madden, formerly assistant secretary of H. M. Byllesby & Company and a member of the organization for twenty years, the last nine of which have been spent in the New York office where he had general charge of the accounting work of the eastern organization, has been transferred to the Chicago office as assistant secretary and assistant treasurer of Byllesby Engineering & Management Corporation and the Standard Gas & Electric Company.

◆

H. Hobart Porter has been re-elected chairman of the Engineering Foundation, research organization of the national societies of civil, mining and metallurgical, mechanical, and electrical engineers. Mr. Porter is president of the American Water Works & Electric Company, chairman of the board of the West Penn Electric Company, and vice-president of the Queensboro Gas & Electric Company. He is the director of numerous other railroad and public utility enterprises.

OBITUARY

James Scullin

James Scullin, 81 years old, pioneer street railway builder, is dead. Born in Helena, N. Y., on March 2, 1850, Mr. Scullin spent his boyhood in Potsdam, N. Y. In 1869 with his brother, Col. John Scullin, he settled in Sedalia, Mo., and when his brother received the contract to build a spur for the Missouri-Kansas-Texas Railway between Sedalia, Mo., and Parsons, Kan., James acted as superintendent of construction. In the late '70s Mr. Scullin located in St. Louis, being active in the development of street railways there. For a while he was superintendent of the so-called Scullin Lines. He retired from this work in the late '90s. He served as a deputy surveyor of customs until elected city marshal. At the end of his second term in that office in 1909 he entered the real estate business. He retired from active business fifteen years ago.

◆

Ambrose Clogher

Ambrose Clogher, who had practiced law in New York since 1920, died suddenly on April 24 at the age of 58. Since establishing his home in New York, Mr. Clogher had represented the New York Railways, the Fifth Avenue Coach Company and other transportation interests before the Appellate Division and the Court of Appeals.

Early in the World War, Mr. Clogher went overseas with the American Expeditionary Force, and from 1918 to 1920 served under the Judge Advocate General of the American Army, presiding over military courts and engaging in other legal work with the American forces.

Born at Washington Mills, N. Y., Mr. Clogher was graduated from Manhattan College, this city, in 1894, and began his legal career in Massachusetts six years later.

◆

W. Emlen Roosevelt

W. Emlen Roosevelt died on May 17, in New York, at the age of 73. Though never so much before the public eye as other members of the Roosevelt family, W. Emlen Roosevelt was one of the most prominent figures in Wall Street, and besides his many activities in railroads, industry and public utilities he was a partner for 52 years in the investment firm of Roosevelt & Sons, one of the oldest houses on the Street.

Unlike other members of the Roosevelt family, there is no record that W. Emlen Roosevelt ever sought or held a public office. He was born in New York and after he was graduated from Harvard entered the firm of Roosevelt & Sons, in which he was a partner at the time of his death. This firm was established in 1797. Theodore Roosevelt, the father of late President Roosevelt and an uncle of W. Emlen Roosevelt, was a partner in the firm.

W. Emlen Roosevelt was widely affiliated with business and banking. He was chairman of the Board of All American Cables, Inc., and a director of Third Avenue Railway, Westchester Electric Railroad, Kingsbridge Railway, Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, New York City Interborough Railway, Belt Line Railway, Union Railway, Dry Dock, East Broadway & Battery Railway, Hastings Railway, New York, Westchester & Connecticut Traction Company, Southern Boulevard Railway, and the Yonkers Railroad.

◆

Thomas A. Cross

Thomas A. Cross, vice-president in charge of claims for the United Railways & Electric Company, Baltimore, and for 39 years prominently identified with the railway system in Baltimore, died on May 13. He succumbed to pneumonia, with which he was attacked less than a week before his death. Mr. Cross was 68 years old. He was unmarried.

Governor Ritchie, of Maryland, and many other men prominently identified with the official and business life of the city and state acted as honorary pallbearers at the funeral on May 15.

Thomas A. Cross

Mr. Cross was president and chairman of the board of the United during the war. Following the war he was succeeded by Charles D. Emmons, who recently resigned. He was nationally known in the utility field.

Mr. Cross entered railway work in Baltimore in 1891, as a lineman for the old North Avenue Traction Company, one of the first successful trolley lines in the country. Two years later he became connected with the Baltimore Traction Company, which operated the old Druid Hill Avenue cable line. After another two years some of the lines of the city were merged in the Consolidated Railway, and Mr. Cross became superintendent of overhead lines. He also served the company in other capacities.

When the United Railways & Electric Company was formed, Mr. Cross was made general manager. In April, 1911, he became second vice-president and in 1917 succeeded William A. House as president and chairman. For a time after he was succeeded as president by Mr. Emmons, he continued as chairman of the board. Upon the resignation of James R. Pratt to enter private business Mr. Cross became vice-president in charge of claims, filling the office until the time of his death.

Mr. Cross was born in Prince George's County, Md. He was graduated from the Maryland Agricultural College, now the University of Maryland. For a short time after he was graduated and before he entered the street railway field, he was connected with a commercial organization.

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Seth W. Baldwin

Seth W. Baldwin, formerly attorney for the Connecticut Company, New Haven, Conn., died suddenly on May 14, in Bethany, Conn. He had been in ill health since early in February, but his death, which was caused by a heart attack, was entirely unexpected. Mr. Baldwin had been connected with the electric railway industry for many years, and was an active participant in the work of the American Electric Railway Claims Association.

Mr. Baldwin was born in Naugatuck, Conn., Dec. 7, 1880. He was graduated from Yale, A. B. 1904, and LL.B. 1906. He was connected with Watrous & Day, New Haven, 1906-07; was claims attorney for the New York, New Haven & Hartford Railroad for Connecticut and New York, 1907-14, and had been attorney for the Connecticut Company since 1914. He was also president of the Morris Cove Company. Mr. Baldwin was awarded the Brady medal for achievement in safety and sanitation on street railways by the American Museum of Safety in 1916.

Funeral services were conducted at Battell Chapel, Yale University, on May 17, the remains being interred in the family plot at Mountain Grove Cemetery, in Naugatuck, Conn.

◆

William A. Whitney, general manager of the Utah-Idaho Central and the Utah Rapid Transit Railroads for six years prior to June, 1923, died in San Francisco on April 17. In 1923 he was made active head of the Mount Hood and Sumpter Valley Railroads in Oregon, as well as manager in charge of operations of the Oregon Lumber Company mills in Oregon and Washington. He continued with the two Utah electric roads at that time as vice-president and director. He was active head of the Eccles lumber and railroad interests in Oregon and Washington. Mr. Whitney went to Ogden as head of the electric roads in 1917 from the position of superintendent of transportation for the Union Pacific. Prior to that time he was superintendent of several different divisions of the Union Pacific and from 1911 to 1914 was superintendent of the Sacramento and Oakland divisions.

◆

Charles R. Johnson, an employee of the Triple Cities Traction Company, Binghamton, N. Y., whose service dated back 45 years to the days of the horse car, is dead. He was 83 years old. Mr. Johnson was born in Glen Castle and came to Binghamton 50 years ago. He entered railway work in the days when separate companies served various parts of the city by horse car and he drove over South Side and North Side lines. Later these lines were amalgamated in the Binghamton Railway, and with the coming of the trolley he was assigned operating duties, a place he held until a few years ago, when less exacting duties were arranged for him by the Triple Cities Traction Company, successor to the Binghamton Railway.

INDUSTRY MARKET AND TRADE NEWS

Milwaukee Company Receives Ten Two-car Trains

Ten new two-car trains especially designed for suburban service, have been purchased from the St. Louis Car Company by the Milwaukee Electric Railway & Light Company for its South Milwaukee line. The first of these trains began operation in rush-hour service between the Public Service building and Grange Avenue, Cudahy, effective Tuesday, April 29. Their operation through to South Milwaukee is contingent on arrangement of a loop track in that suburb.

The new trains are of the most modern type, with steel body construction, streamline appearance and latest features for passenger comfort. They are built on the three-truck principle, with a passageway between cars open for use at all times. Entrance and exit doors are at the front end of the second car, and an emergency exit is provided at the front of the forward car. Special truck construction reduces the over-all height of the new trains, and the exterior color scheme of chrome yellow and green accentuates their long, low appearance. Interior head-room has not been reduced, however, and seats are provided for 119 passengers. Smoother riding qualities are calculated to result from the special form of suspension and lower center of gravity.

The forward car has leather upholstery, and the rear car, on which smoking will be permitted, has standard rattan seats. Otherwise the two cars are identical, with electric heating, special insulation, semi-indirect lighting, rubber-tile floor covering, wide aisles and improved exhaust ventilators. Improved acceleration and braking are provided, with six 50-hp. motors, as well as air brakes applying to all twelve wheels. The trains are of the single-end type, requiring loop facilities at the terminals of the line.

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Ten Cars for Knoxville Power & Light Company

Ten double-truck, double-end cars of the arch-roof type, with all steel bodies, have been ordered by the Knoxville Power & Light Company from the Perley A. Thomas Car Works, Inc., of High Point, N. C., delivery to be made some time in August.

Equipment specifications are as shown below:

Length over all	39 ft. 4 in.
Length over body posts	29 ft. 3 in.
Truck wheelbase	20 ft. 0 in.
Width over all	8 ft. 5 in.
Air brakes	Westinghouse Air Brake Co.
Armature bearings	Plain
Axles	A.E.R.E.A. standard type E2
Car signal system	Faraday
Compressors	Westinghouse DH 16
Conduit	Flexible
Control	General Electric K-75
Curtain fixtures	Adams & Westlake
Curtain material	Pantasote, double faced
Destination signs	Keystone
Door mechanism	National Pneumatic Co.
Doors	Folding
Fare boxes	Johnson
Finish	Enamel
Floor covering	Linoleum
Glass	Plate
Hand brakes	Peacock staffless
Hand straps	Buffalo type
Heaters	Consolidated Car Heating Co.
Headlights	Golden Glow NRM 96
Headlining	Haskelite
Interior trim	Cherry
Journal bearings	Plain
Journal boxes	A.E.R.E.A. standard
Motors, four	G. E. 265
Painting scheme	Cream and orange
Roof material	Haskelite, canvas covered
Sash fixtures	Adams & Westlake Co., brass sash
Seats	Hale & Kilburn, No. 392-A
Seating material	Green plush
Steps	Folding
Step treads	Kass
Trolley	Ohio Brass Co.
Trolley base	R. D. Nuttall Co., U. S.-20
Trucks	Brill 76-E-1-X
Ventilators	Nichols Lintern Type C
Wheels, type	Steel, diameter 26 in.
Wheelguards or fenders	H. B. Wood slat

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Delivery of Detroit Cars to Start in June

Additional details of the 130 cars recently ordered from the St. Louis Car Company by the City of Detroit Department of Street Railways are now available. The new cars, which will be of semi-steel construction of the arch-roof type will have an over-all length of 48 ft. 5 in. They will be single-end, double-struck, front-entrance, center-exit, arranged for two-man operation. Seats will be provided for 52 passengers. It is understood that the order for air brakes, control apparatus, and motor equipment, of which there will be four to each car, will be divided equally between the Westinghouse and General Electric Companies. Steel wheels of 26-in. diameter will be provided.

Other specifications are as follows:

Curtain fixtures,	Curtain Supply Company's No. 88
Curtain material	Double faced Pantasote
Glass	Libby-Owens plate
Headlining	$\frac{3}{16}$ in. Agasote
Interior trim	Kiln dried mahogany
Lamp fixtures,	Electric Service Supply Company
Sash fixtures	O. M. Edwards, metal
Seating material,	Full grain brown Spanish leather
Step treads	Kass, No. 14
Trolley catchers	Ohio Brass No. 13141
Trolley bases	Ohio Brass Form 5
Ventilators	12 Railway Utility Company Honeycomb vent
Wheelguards	H-B type

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Mercedes Benz Company, Inc., announces the appointment of the National Railway Appliance Company, 420 Lexington Avenue, New York City, as their representative for Diesel engines, and buses and trucks equipped with Diesel motors.

New Interurban Cars for Northern Indiana Railway

Carrying out a rehabilitation program promised at the time of the company's reorganization, the Northern Indiana Railway, Inc., South Bend, Ind., has ordered ten interurban cars from the Cummings Car & Coach Company, Paris, Ill. The cars, which are designed for one-man operation and which are expected to attain a speed of 60 m.p.h., will be ready for delivery by June 1, and will replace the present interurban cars which carry crews of two men.

The new cars are well proportioned, with streamline body design, and are divided into three compartments, main passenger, smoking, and baggage, with a total seating capacity of 51, including the upholstered folding seats in the baggage section. Inside finish is walnut, with chromium plated metal trimmings. Total weight is 42,000 lb. Over-all length is 47 ft. 2 in., width over-all, 8 ft. 10 in., and height, rail to trolley base, 10 ft. 8 in.

One-man cars of attractive design replace heavier rolling stock on Northern Indiana Railway

Motor and control equipment consists of four Westinghouse No. 516, 50-hp. motors, and K-75 tapped field control. Westinghouse air brakes and safety control are provided. Trucks are Cummings Car & Coach Company's No. 64, equalizer type, with 4½ in. by 8 in. journals and 28-in. wheels. Wheelbase is 5 ft. 6 in. Other details of specifications are as follows:

Armature bearings	Plain
Car signal system	Faraday
Curtain fixtures	Excel
Curtain material	Pantasote
Destination signs	Keystone
Door mechanism,	National Pneumatic Company
Doors,	Front folding; rear sliding for baggage
Floor covering	Tucolite
Gears and pinions	Westinghouse
Hand brakes	Pittsburgh No. 35
Heaters	Consolidated
Headlight	Ohio Brass Company
Headlining	Agasote
Journal boxes,	Cummings Car & Coach Company
Lamp fixtures	Dayton, dome type
Paint,	Enamel outside; strain and varnish inside
Roof material	Wood, canvas covered
Sash fixtures	A&W brass, chromium plated
Seats	American Wicker Works
Seat spacing	34 in.
Seat covering	Plush and leather
Trolley retriever	Knutson No. 5
Trolley base	Ohio Brass Company
Ventilators	Railway Utility Company

Specifications of Baltimore Cars

Complete specifications of the 150 cars now under construction for the United Railways & Electric Company, of Baltimore, are now available. As previously stated in this magazine, 100 of the bodies are to be constructed by the J. G. Brill Company, at Philadelphia, while 50 bodies will be supplied by the Cincinnati Car Corporation. Equipment specifications, which are substantially the same in both orders, are as follows:

Air brakes	Westinghouse Traction Brake Company
Armature bearings	Plain
Axles, 4½ in.	Bethlehem Steel Company
Car signal system	Electric Service Supply Co., No. 27801 CB push button
Compressors	Westinghouse DH-20
Conduit	Flexible
Control	75 Westinghouse "VA -75 GE. "PCM"
Couplers	Portable draw bar
Curtain fixtures	Adams & Westlake No. 88
Curtain material	Pantasote double face No. 80
Destination signs	Hunter
Door mechanism	National Pneumatic Company
Doors	Folding
Energy saving device	Economy meter
Fare boxes	Johnson
Floor covering	3/16-in. battleship linoleum
Gears and pinions	Tool Steel Gear & Pinion Company
Glass	Sheet glass, double thick
Hand brakes	Peacock staffless
Heaters	Railway Utility Company's panel type
Headlights	Electric Service Supply Co. FH-916
Headlining	Agasote
Interior trim	Wood and metal
Journal bearings	J. G. Brill, plain
Journal boxes	J. G. Brill
Lamp fixtures	Electric Service Supply Co., dome
Motors	four, Westinghouse 516-GE-301, inside hung
Registers	Johnson Electric and International R-7
Roof type	Arch
Roof material	Wood, canvas covered
Safety car devices	National Pneumatic Company
Sash fixtures	Adams & Westlake—O. M. Edwards
Seats	J. G. Brill
Seat spacing	31½-in.
Seating material	Leather
Slack adjusters	Brill automatic
Steps	Stationary
Step treads	Kass
Trolley catchers	Earll No. 10
Trolley base	Ohio Brass Company
Trolley wheels	Ohio Brass Company
Trucks	J. G. Brill, 177-E 1
Ventilators	Railway Utility Company
Wheels, type	Rolled steel, diameter 26 in.
Wheelguards or fenders	H. B. life guard

◆

Electric Railway Material Prices—May 24, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	13.00
Lead, cents per lb.	5.50
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	4.95
Tin, Straits, cents per lb.	31.75
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	41.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.20
Somerset mine run, f.o.b. mines, net ton	2.00
Pittsburgh mine run, Pittsburgh, net ton	1.40
Franklin, Ill., screenings, f.o.b. mines	1.55
Central, Ill., screenings, f.o.b. mines	1.45
Kansas screenings, Kansas City	1.85

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive $\frac{9}{16}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.08
Angles bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.80
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.20
Sheet iron (24 gage), cents per lb.	2.60
Sheet iron, galvanized (24 gage), cents per lb.	3.25
Galvanized barbed wire, cents per lb.	2.85
Galvanized wire, ordinary, cents per lb.	2.80

Waste—New York

Waste, wool, cents per lb.	10.00 to 15.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	9.00 to 12.00
Colored	6.00 to 10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.2
White lead in oil (100 lb. keg), cents per lb.	13.75
Turpentine (bbl. lots), per gal.	0.54
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	14.00
Rubber-covered wire, No. 14, per 1,000 ft.	$5.30
Weatherproof wire base, cents per lb.	14.75

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.25
Light copper, cents per lb.	8.75
Heavy yellow brass, cents per lb.	5.80
Zinc, old scrap, cents per lb.	2.25
Lead, cents per lb. (heavy)	3.75
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	16.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.50

Recent Bus Orders and Deliveries

Conspicuous among recent orders for automotive equipment is that of the City of Detroit Department of Street Railways for six trolley buses and 50 40-passenger, gas-electric, metropolitan type buses. The trolley buses will be from the Twin Coach Company, and delivery is expected by the first of June, but the order for buses is being held up pending further consideration by the City Council.

Twin Coach Company has made delivery of 29 trolley buses and two urban-type coaches to Chicago Surface Lines. Los Angeles Motor Coach Company and the San Diego Electric Railway have each received two of the Twin Coach urban-type buses.

Recent White deliveries include one Model 65 bus to the Denver Tramway Corporation, five Model 65A buses to Montreal Tramways, and one 65A bus to Southern Public Utilities, of Winston-Salem, N. C. The Boston, Worcester & New York Street Railway has placed in express service, Boston to Worcester, five 37-passenger de luxe White buses, while four 29-passenger buses have been added to the Boston-New York service.

Among deliveries reported by the Mack-International Motor Truck Corporation are two Model AB 25-passenger buses for city service to the Lincoln Traction Company, Lincoln, Neb., one bus of similar type to the Fonda, Johnstown & Gloversville Railroad, one Model AB 23-passenger bus for intercity service to the Oklahoma Union Railway, Tulsa, Okla., and one Model BC 33-passenger, city-type bus to the Nashua Street Railway, Nashua, N. H.

New Cars for Mobile, Ala.

The Mobile Light & Railroad Company recently received seven all steel, one-man, single-truck cars for city service, of which four were supplied by the Perley A. Thomas Car Works, Inc., and three by the American Car Company, of St. Louis. The Thomas cars are of the double-end type, while those supplied by the American Car Company are single-end. Dimensions and weight are substantially the same, but detail specifications differ in certain respects.

The cars will have an over-all length of 29 ft. 9 in., an over-all width of 8 ft. 3 in., and a truck wheelbase of 8 ft. 6 in. Weight will run about 19,000 lb. Seating capacity is eighteen passengers.

Specifications are as follows:

Builder of car body	Perley A. Thomas Car Works	American Car Company
Air brakes	Westinghouse Air Brake Company	Westinghouse Air Brake Company
Armature bearings	Plain	Roller
Axles	A.E.R.E.A. standard	Brill
Car signal system	Faraday (Electric Service Supply Company)	Faraday
Compressors	Westinghouse DH-16	Westinghouse DH-16
Conduit	Flexible	Flexible
Control	General Electric K-35	Westinghouse K-63-G
Couplers		
Curtain fixtures	Adams & Westlake	Curtain Supply Co. No. 49
Curtain material	K-2 Pantasote	K-2 Pantasote
Destination signs	Keystone	Hunter
Door mechanism	National Pneumatic Co.	National Pneumatic Co.
Doors	Folding	Folding
Energy saving device		
Fare boxes	Johnson DM-4	Johnson DM-4
Finish	Enamel	Vitralite enamel
Glass	Plate	Plate
Hand brakes	Drop handle type	American Car Company
Hand straps	National Railway Appliance	None
Heat insulating material		
Heaters		
Headlights	Ohio Brass type WDF	Crouse-Hinds No. 28519
Interior trim	Mahogany	Mahogany
Journal bearings	Plain	Plain
Journal boxes	A.E.R.E.A. standard	Brill
Motors	G. E. 265	Westinghouse 510-E
Painting scheme (color used)	Traction orange	Traction orange
Roof type	Arch	Arch
Roof material	Wood, canvas covered	Wood, canvas covered
Safety car devices		
Sash fixtures	O. M. Edwards A-525-6	O. M. Edwards A-525-6
Seats		Brill "Waylo" reversible
Seat spacing		28 in.
Seating material	Cherry	Mexican mahogany
Slack adjusters		Brill, air operated
Steps	Folding	Folding
Step treads	American Abrasive	Feralun
Trolley	Earll No. 10	Earll No. 10
Trolley base	Nuttal 20-A	U. S. No. 20-A
Trolley wheels	G. E. Feist	G. E. Feist
Trucks	Brill 79-E-2	Brill 79-E-2
Ventilators	Brill exhaust type	Brill exhaust type
Wheels, type	Rolled steel Diam. 26 in.	Rolled [illegible]
Wheelguards or fenders	H. B.	H. B.

WITH

increasing

TRAFFIC HAZARDS

The populace of every city in the country is clamoring for accelerated movement of vehicles.

With this increased speed comes increased accident hazards. And with increasing traffic hazards you need emergency brakes that will act under any conditions.

Specify "Peacock" Staffless Brakes

"PEACOCK" STAFFLESS BRAKES

National Brake Company

890 Ellicott Square, Buffalo, N. Y.
Canada:—Lyman Tube & Supply Co., Ltd., Montreal
General Sales Office: 50 Church Street, New York City

Ten Exclusive Advantages of Twin Ties

1. (a) The largest effective bearing per track foot.
    (b) Largest per cent total rail base area carried.
    (c) Largest effective bearing on ballast.
    (d) Largest effective bearing on the subgrade.

2. Best distribution of steel per track foot.

3. The only Precision Type Rail Clip which is rolled, drilled and machined to fit rail sample.

    Note: not punched, nor cast.

4. The first rail fastening furnished with a heat treated, high tensile bolt — 100,000 pounds ultimate strength.

5. The only tie provided with auxiliary anchors into concrete base. (4 plate anchors in each plate, 8 per tie, bent down and twisted into the base concrete.)

6. The only construction with a complete line of installation machinery which makes certain correct installation.

7. The construction with which the revolutionary "mortarflow" principle is available. This principle has completely changed the results with concrete base construction. With it for the first time, the steel ties and rail are made a truly integral part of the concrete base. In effect, the track structure is "mixed" with the concrete just as effectively as a good concrete mixer mixes the stones of the aggregate with the cement paste as the drum revolves.

8. The lowest initial costs of any generally used track designs.

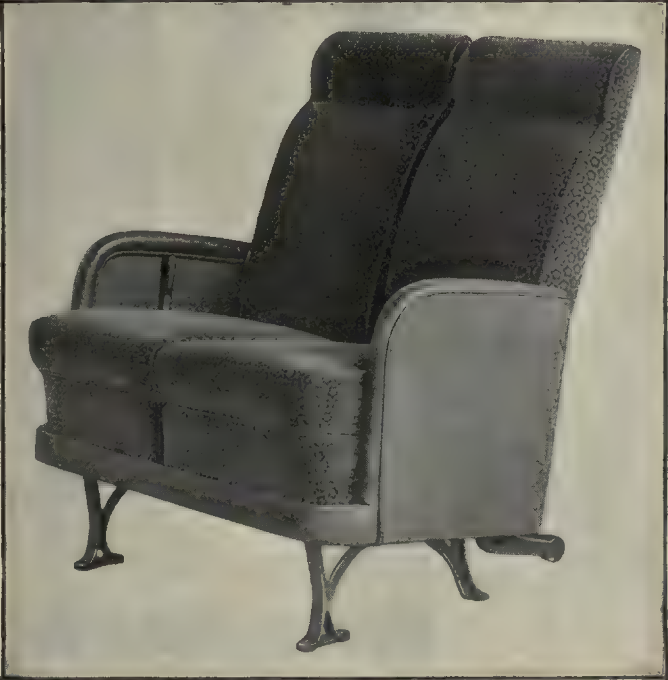
9. Actual service records and details of present conditions indicate 20 to 35 years' life depending on traffic and rail head wear.

10. The construction which has had the largest acceptance by the big city properties for heavy city service.

Write for Detailed Information and Prices

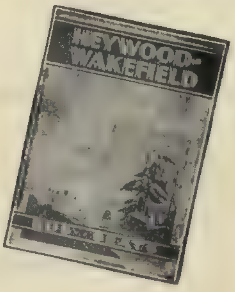
INTERNATIONAL STEEL TIE COMPANY

CLEVELAND, OHIO



A De Luxe Reclining Chair!

The 155-P is one of the most luxurious and comfortable reclining bus chairs ever produced. As shown above, in a smart upholstery combination of leather and plush, this modern seat offers long, satisfying wear, as well as a distinctive appearance. Both the cushion and back on this style are designed and pitched for restful comfort. The soft, spring-filled back is concave and has a pillow-type headroll. The back may be reclined to three positions by pressure on the handily located lever at the side of the chair. Write to the nearest Heywood-Wakefield sales office for complete details of the 155-P and other popular bus seats in our line.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.

439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas

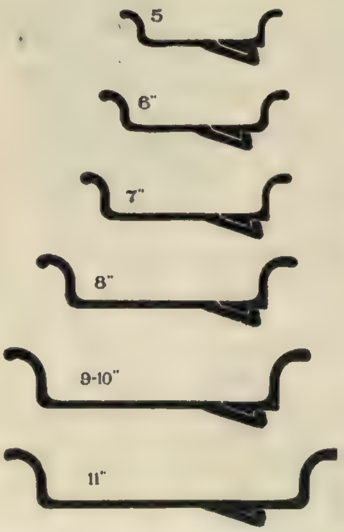
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

K

All standard sizes

All standard diameters

20" 22" 24"



Standardize your fleet on K Rim equipment

Here is the lightest rim for its strength you can buy. And no stronger rim is on the market today. Two easy pries with a bar prepare rim for mounting tire. Merely stepping on rim puts it firmly together. K Rims are moderately priced. By far the easiest and safest bus and truck rim equipment. Goodyear K Rims are standard on many leading makes of trucks and buses. Equip your fleet now. Specify K Rims for new units.

The man who changes the tires likes K Rims.

GOODYEAR

K RIMS FOR TRUCKS AND BUSES

"IN 3 YEARS

PRACTICALLY NO ROAD FAILURES"

On the great roll call of Goodyear Bus Tire users is the name of Crandic Stages, Inc., Cedar Rapids, Iowa. The experience of this company tallies with the experiences of the many others who have made it a fact that more motor coaches ride on Goodyear Tires than on any other tires in the world.

They find in these tires almost complete freedom from road failures—just as they find powerful, road-gripping traction which helps to keep their coaches running every day in the year.

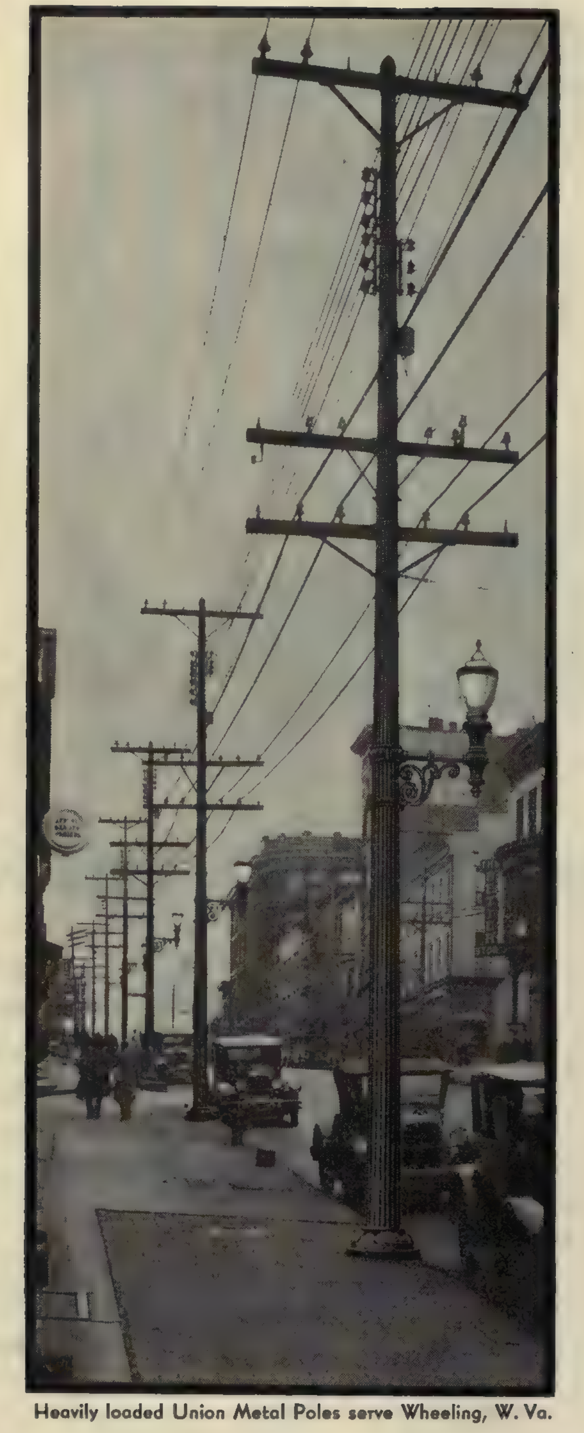
Again and again, we have said there are just two main parts to a tire—tread and carcass. In these two parts, Goodyears prove themselves definitely superior—which is why they continue to hold first place on coaches, on trucks, on passenger cars.

Surely, it will also pay you to find out why more people ride on Goodyear Tires than on any other kind.

THE GREATEST NAME IN RUBBER

GOODYEAR

ON YOUR NEXT MOTOR COACHES
SPECIFY GOODYEARS



Heavily loaded Union Metal Poles serve Wheeling, W. Va.

For Heavy Duty Work on City Streets

UNION METAL POLES have become widely known as the finest equipment for combination street lighting and distribution line systems. Such installations are usually ornamental and carry only a light load.

For extremely heavy loading, Union Metal Poles are just as practical and economical. While doing the job of the ordinary pole, they also improve the street appearance and build good-will for themselves.

In Wheeling, W. Va., one set of Union Metal Poles carries light and power circuits, railway feeders, fire-alarm circuits, trolley span wires, street lighting fixtures, traffic signals and street signs. This installation decreased the number of poles along the curb and substituted a straight, attractive fluted pole for the unsightly equipment of the ordinary type.

No matter what your strength requirements, Union Metal can supply poles to fill the need.

THE UNION METAL MANUFACTURING COMPANY
GENERAL OFFICES AND FACTORY • CANTON, OHIO
SALES OFFICES: New York, Chicago, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
Graybar Electric Company, Inc. General Electric Supply Corp.
Offices in all principal cities

Distributed by GraybaR

UNION METAL DISTRIBUTION POLES

WHEELS

that are strong, safe and durable!

Wheels for electric railway cars must be good wheels. Only wheels made from the best steel by the most modern methods stand up under the severe operating conditions encountered today. That is why so many electric railway executives are turning to Bethlehem Wrought Steel Wheels.

Strength, endurance and wearing qualities are worked into Bethlehem Wrought Steel Wheels during the process of manufacture. Five distinct forging and rolling operations are required to make a Bethlehem Wheel. The forging gives the metal density and toughness. The rolling produces a refinement in grain structure with a corresponding increase in strength and ductility. Each wheel is thoroughly tested and inspected at every step throughout the process of manufacture.

In addition to their endurance and wearing qualities Bethlehem Wrought Steel Wheels for electric railway service have a liberal margin of safety. That is why the buyer may rest assured that he will receive from each wheel many thousands of miles of trouble-free service. Your inquiry will receive prompt attention.

BETHLEHEM STEEL COMPANY, *General Offices:* Bethlehem, Pa.

***District Offices:* New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.**

***Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu.**

***Export Distributor:* Bethlehem Steel Export Corporation,**
25 Broadway, New York City

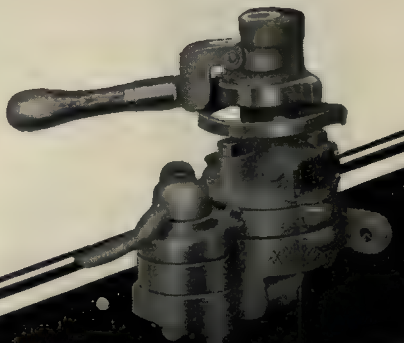
BETHLEHEM

The SAFETY CAR ▲ ▲ ▲
CONTROL EQUIPMENT

▲ ▲ ▲ ▲ **INCREASES**
Safety of Operation

INTERLOCK feature permits centralized operating responsibility . . . prevents opening of doors before car stops, or starting of car before doors close . . . and causes an emergency brake application if controller handle is released due to motorman's negligence or disability while car is in motion.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH



NATIONAL
SHELBY
TROLLEY POLES

Minimum weight with maximum strength

TO keep daily service at the highest peak of efficiency means the elimination of delays or traffic tie-ups frequently caused by trolley poles failing to hold up in service. Reliable poles, therefore, are a good investment. Their selection should be based on design and tests that prove their fitness for the character of service in which they will be used.

NATIONAL-SHELBY Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service.

In addition, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

NATIONAL TUBE COMPANY
Frick Building, Pittsburgh, Pa.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES OF UNITED STATES STEEL CORPORATION:

American Bridge Company
American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
Minnesota Steel Company
National Tube Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Atlas Cement Company

Pacific Coast Distributors–United States Steel Products Co., Columbia Department: San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*–United States Steel Products Co., New York City

Are You Paying for Timken Bearings Without Getting Them?

In preparing specifications for street car journals and electric motors, it will pay you well to include "Timken Bearing Equipped."

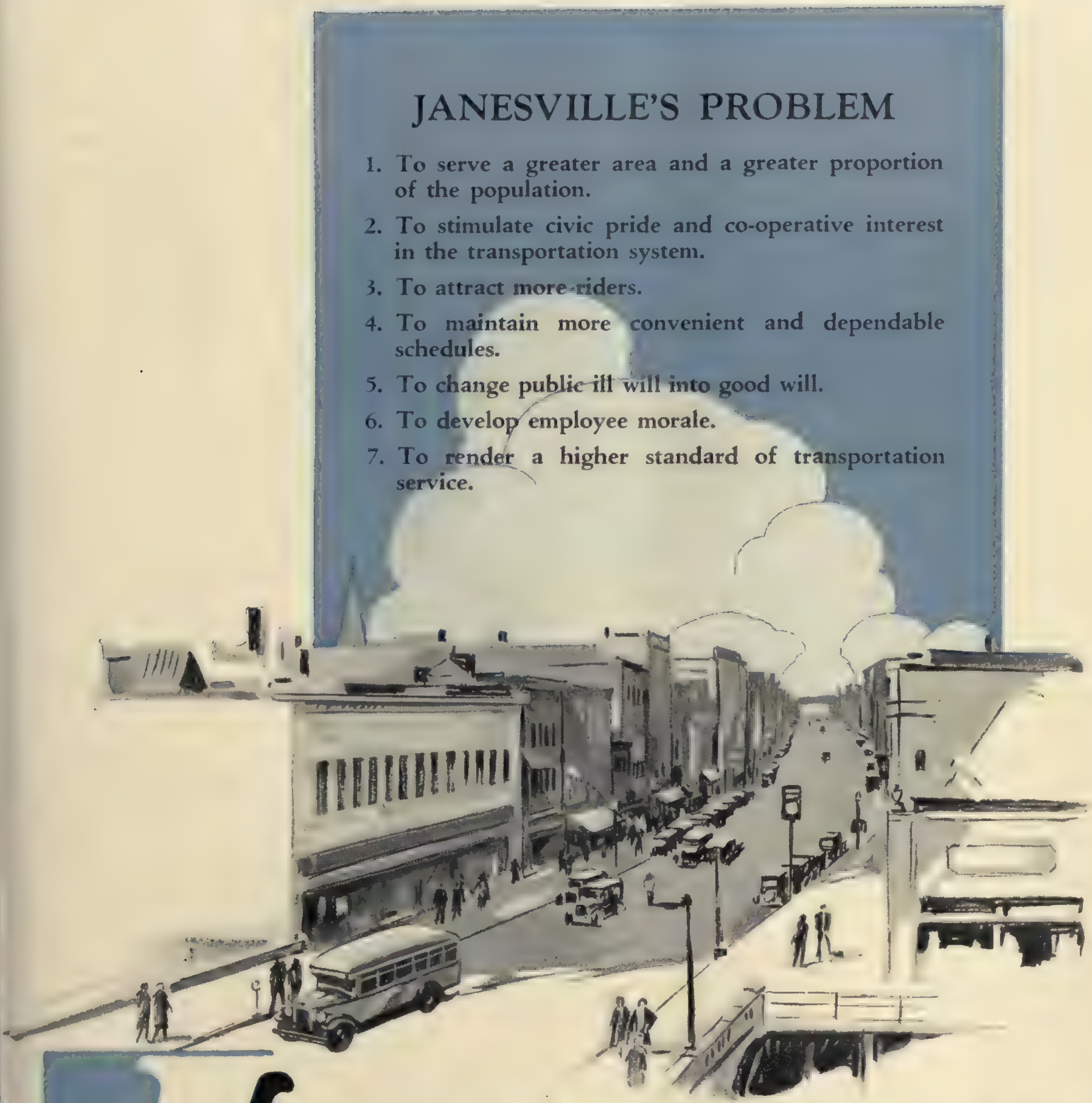
The basic requirements of an efficient anti-friction bearing are (1) anti-friction efficiency, (2) maximum radial capacity in the smallest unit of space, (3) thrust capacity without sacrificing the principle of design, (4) combined radial and thrust capacity, (5) take-up to facilitate assembly and compensate for wear.

In buying anti-friction bearings you pay for every one of these qualities, and you have a right to expect and demand every one of them. For anything short of that does not give you the anti-friction advantages required in your equipment.

The Timken Tapered Roller Bearing is the *only* anti-friction bearing that meets *all* of these requirements. Are you getting full value for your anti-friction money—or are you *paying* for Timken Bearing advantages without getting them?

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* BEARINGS



JANESVILLE'S PROBLEM

1. To serve a greater area and a greater proportion of the population.
2. To stimulate civic pride and co-operative interest in the transportation system.
3. To attract more riders.
4. To maintain more convenient and dependable schedules.
5. To change public ill will into good will.
6. To develop employee morale.
7. To render a higher standard of transportation service.

JANESVILLE SOLVED THE RIDDLE . . . .

With a population of only 22,000, Janesville, Wisconsin, has found a practical solution of the small city transportation problem

On July 17, 1929, Janesville, Wisconsin, gave up the struggle to make transportation by street cars pay.

Former revenues of 30 cents per car mile had declined to an average of 12 cents. Even with deferred maintenance, the expense per car mile was approximately 17 cents. Already the Janesville Traction Company had been through two receiverships. It faced a change in the residential districts of the city. New sections were blocked by costs from adequate service.

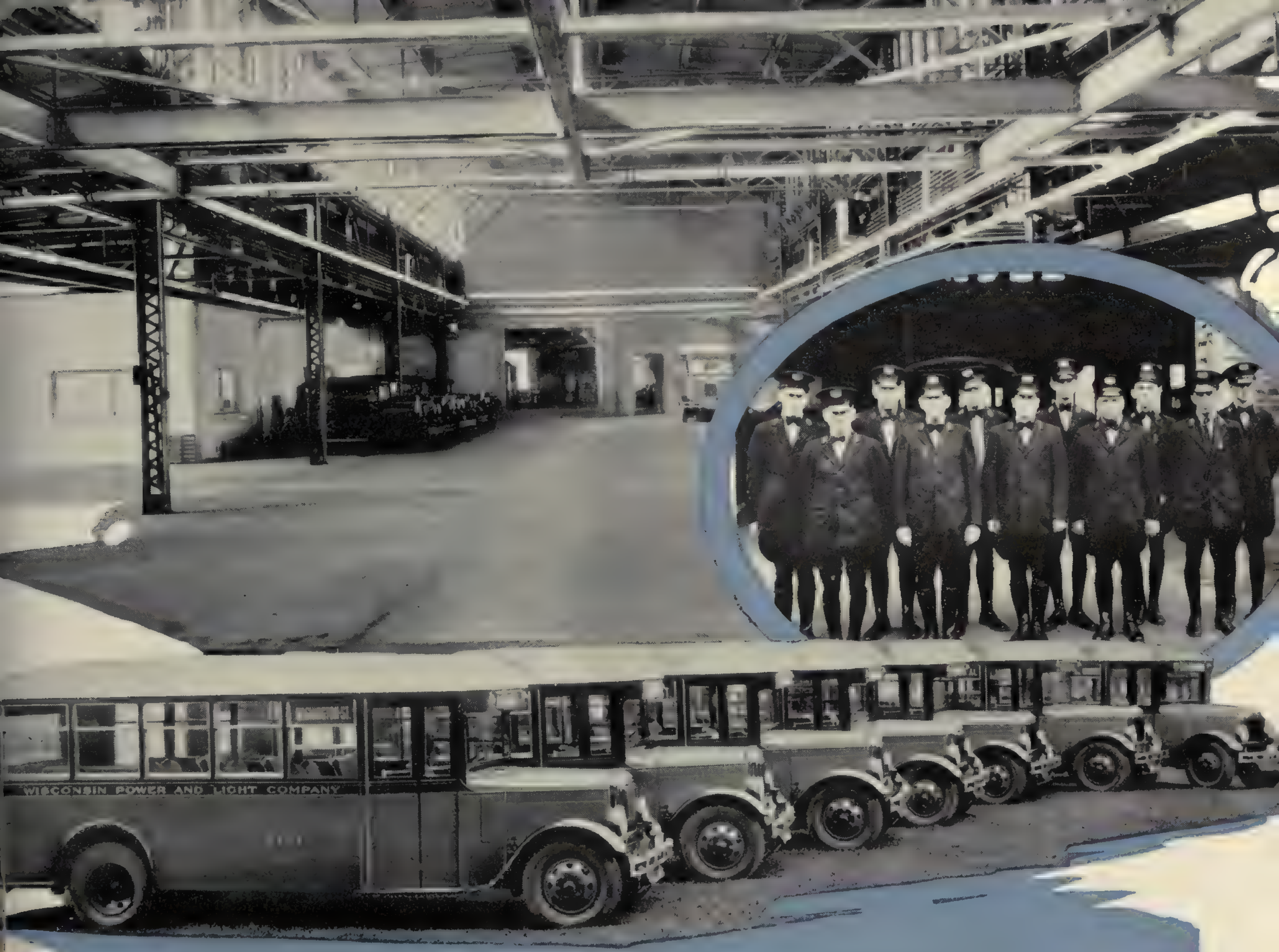
Yet Janesville, typical of so many small American cities, found the way out of its dilemma when it turned to motor coach operation as a substitute for unprofitable street car service.

ON July 17, 1929, street cars in Janesville made their last trip. The equipment, consisting of 8 one-man cars, the old car barns and eight miles of run-down single track, went into the discard.

Janesville was ready for the change. Its population, merchants and civic bodies turned eagerly to the new transportation plan offered by the new owners—the Wisconsin Power & Light Company. From sunset to sunrise, the public of Janesville reviewed its new system of motor coach transportation, tested the new facilities and voiced their approval.

The changed and friendly attitude of the leading merchants and manufacturers has directly contributed to the increased patronage of the new transportation system. Out of their own pockets these public-spirited citizens paid for 2-page

On July 17, 1929, street cars in Janesville made their last trip. The equipment, consisting of 8 one-man cars, the old car barns and eight miles of run-down single track, went into the discard.



Today in Janesville the same crews that operated the street cars run the Yellow Coaches—but with what a difference in morale!

These operators are proud of their calling. And it was a simple matter to train them on coaches before the shift-over was made.

They are efficient, courteous—better men in every respect—boosters all for the service they now offer.

Thus do Yellow Coaches not only modernize a transportation system, but the men who operate it, as well.

---

newspaper advertisements to recommend and explain to the public the advantages of the improved service to Janesville.

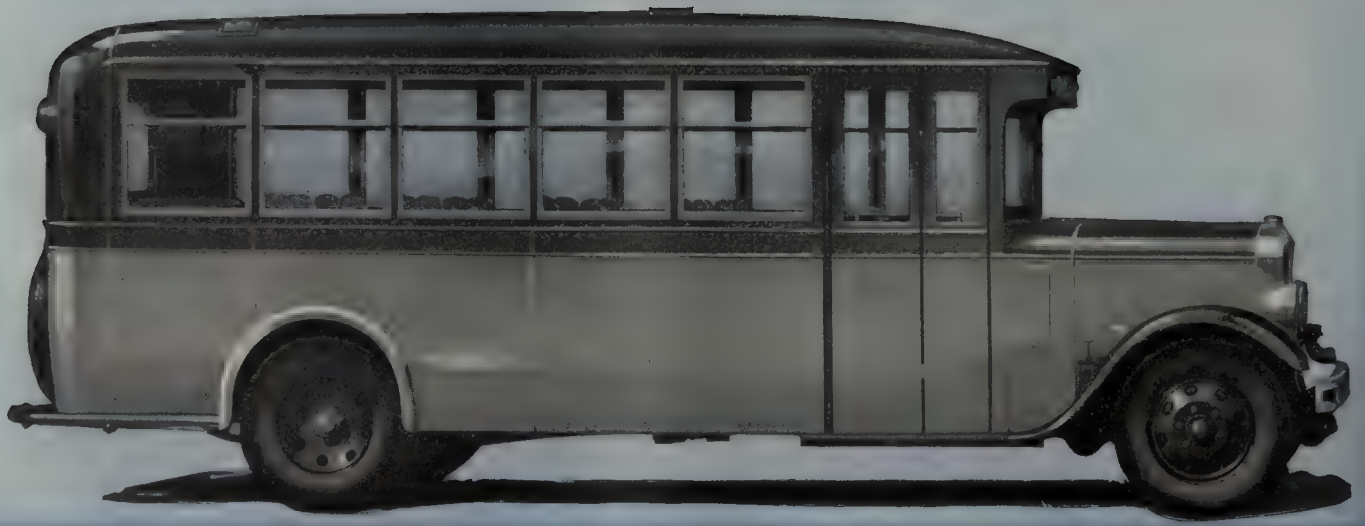
Schedules with route maps, showing time points, were mailed to every resident. Attractive newspaper advertising was conducted according to a well-planned program.

Janesville as a city is now solidly behind its new transportation service.

Records made by the 7 Type W 23-passenger Yellow City Service Coaches that were placed in service tell their own story.

Passenger traffic on the coaches has been showing a steady increase over the street cars. A greater area of the city and a greater proportion of the population are now being adequately served. Schedules are more dependable and more convenient.

With modern motor coach equipment replacing run-down electric traction service, a modern garage taking the place of the dilapidated car barns and dependable schedules substituting for former interruptions, Janesville has solved its transportation riddle.



Type "W" City Service Coach

21-23 Passenger Capacity

ILLUSTRATED above is the Yellow Type "W" City Service Coach that solved the riddle for Janesville.

Here *is* passenger car performance, with low operating and maintenance costs! Seats for 23 passengers. An ideal vehicle for small city use.

No wonder Janesville responded like many other cities of comparable size when these comfortable, fleet-footed coaches replaced the old noisy cars. No wonder traffic is steadily increasing. And no wonder that Janesville as a city is now solidly back of its new transportation system.

GENERAL MOTORS TRUCK COMPANY
Subsidiary of Yellow Truck & Coach Mfg. Co.
Pontiac, Michigan

It Pays to Standardize

Operators requiring vehicles of different capacities and types may now standardize on any combinations of Type "W" and Type "U" coaches for city service, parlor de luxe service or inter-city work. Capacities range from 16 to 25 passengers with a choice of two different engines. Bodies and a majority of chassis parts and many body parts, are interchangeable. Maintenance is greatly simplified. Capital tied up in parts inventory can be greatly reduced. Standardization means greater operating flexibility, greatly simplified maintenance and better all around economy.

BEFORE	AFTER
8 street cars	7 buses
8 miles of single track in poor condition.	15 miles of coach service, all on city paved streets
Steadily declining passenger traffic	Increase in passenger riders
Delays and interrupted service	Adequate schedules maintained, with transfers from coach to coach
Public ill will	Public approval

Models Ideally Suited for Small City Service

Type "U" 185″ w.b. 16 pass. Parlor Coach
Type "U" 185″ w.b. 21-23 pass. City Service Coach
Type "U" 185″ w.b. 21 pass. Observation Parlor Coach
Type "W" 185″ w.b. 17 pass. Parlor Coach
Type "W" 185″ w.b. 21-23 pass. City Service Coach
Type "W" 185″ w.b. 21 pass. Observation Parlor Coach
Type "W" 215″ w.b. 21-25 pass. Observation Parlor Coach

With Yellow Coaches

One

hot bearing every 68,588 miles

Lubrication cost 22¢ per M miles

When an Indiana City and Suburban Electric Railway recently made a check of their operating costs over the past five years they discovered lubrication facts that will interest all Electric Railway officials.

During the five year period this company's cars traveled 8,847,838 miles. There were but a total of 129 hot bearings throughout this entire mileage . . . one hot bearing for each 65,588 miles. The cost of car journal oil averaged 12.5 cents per thousand miles. Compressor oil costs amounted to 3.9 cents per thousand miles. Gear grease costs were 5.6 cents per thousand miles. The total lubrication costs were 22 cents per thousand miles.

It is not only the low cost of lubrication that makes this survey interesting but likewise the infrequency of bearing troubles, the savings in waste and babbit metal, and the reduction in power costs. When lubrication costs are computed on this basis, the true value of S. O. C. I. Lubricants is apparent. Car Journal Oils, Gear Greases and Compressor Oils which we have developed for electric railway service will keep your lubrication costs low, just as they have for other companies.

Prove this to yourself, make a six months' test in your equipment. If you will communicate with our nearest office one of our lubrication engineers will be glad to call on you and assist you in planning such a test.

Hear the Chicago Symphony Orchestra every Sunday at 2 p. m., Central Standard Time, over the following stations:

WGN	Chicago
WWJ	Detroit
WTMJ	Milwaukee
KSD	St. Louis
WOC	Davenport
WHO	Des Moines
WEBC	Superior
KSTP	St. Paul-Minneapolis
WDAF	Kansas City
WOW	Omaha

STANDARD OIL COMPANY (*Indiana*)

General Offices: 910 South Michigan Ave. Chicago, Illinois

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Davenport
Decatur
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Evansville
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Kansas City
La Crosse
Mankato
Mason City
Milwaukee
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Minot
Saginaw
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Peoria
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South Bend
St. Louis
St. Joseph
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LUBRICANTS FOR ALL INDUSTRY

205-A

More

American Electric Railway Association
San Francisco, June 23rd to 26th
Headquarters—Hotel St. Francis

THE TIMKEN DETROIT

passengers per car-hour

You don't have to figure the result of carrying more passengers per car-hour.

Timken Worm Drive's vital contribution to the Electric Railway Industry may be summed up in this phrase—"More passengers per car-hour".

LESS NOISE	LESS WEIGHT
FAST, SMOOTH STARTING	FASTER SCHEDULES
QUICKER, SMOOTHER STOPS	POWER SAVED

LOWER COST OF MAINTENANCE

through these benefits Timken Worm Drive equipment induces more people to ride; helps to hold that increased patronage; and cuts the cost of carrying them.

TIMKEN
worm drive
TRUCKS

DTA CO

for electric railway cars

AXLE CO., DETROIT MICH.

PERMANENT —

or non-permanent - -

METAL & THERMIT

Pittsburgh Chicago Boston 120 BROADWAY

Should the complete track structure be of the "single-life" type, which can be torn up and destroyed when the rail is worn out, or when the authorities demand changes in the street?

Or should the structure be permanent and provide for renewal of rail from time to time as the rail wears out?

Excellent arguments for both sides have been presented. The views of prominent and experienced track-men have been published and will no doubt be discussed at the coming Convention. Local conditions, many times, govern these matters and probably no definite answer will be found for the entire industry. Both schools of thought have excellent reasons for their case.

Whatever type of track construction is adopted, however, it is apparent to everyone that the life of the rail itself is one of the controlling factors. No matter what kind of track construction is used the life of the rail is dependent on the life of the joints. Defective joints not only shorten the life of the rail but they seriously impair the life of the structure as well. In our estimation, maintenance-free joints are the most important feature of the whole matter because no matter how good a foundation may be built defective joints will ruin it and the maintenance cost will be excessive.

On railway after railway Thermit welded joints have proved the best insurance of long-lived smooth-riding track. They are easy to install and last as long as the rail.

The large illustration shows workmen installing a long section of Thermit welded rail in Birmingham. Rail can thus be welded in as long lengths as convenient outside the track and snaked into position either between cars or at night. There is no interruption to street car traffic during the course of the construction and this method of laying rail is cheaper in the long run than piecemeal renewal of one rail after another in the track.

Thermit Welding

permits reconstruction without delaying street car traffic;

requires no bolting or bonding at rail joint;

makes one continuous piece of rail without a break;

permits the use of lighter rail in many cases;

does away with need for "compromise joints" at special work;

eliminates joint repairs for the life of the rail.

CORPORATION

EW YORK, N.Y. South San Francisco Toronto

Three Years of Interurba

SINCE 1927, the bus fleet of The Youngstown and Suburban Transportation Company has operated on Cities Service Products *exclusively.*

During that time these buses have carried more than 500,000 passengers and traveled more than one million miles. Cities Service Gasolene, Koolmotor Bus Oil, and Koolmotor Greases have met every test imposed by this strenuous service, for before these products were ever offered to bus owners they were thoroughly tested in the most practical proving ground in America—the Cities Service fleet of more than 4000 motor vehicles of all types.

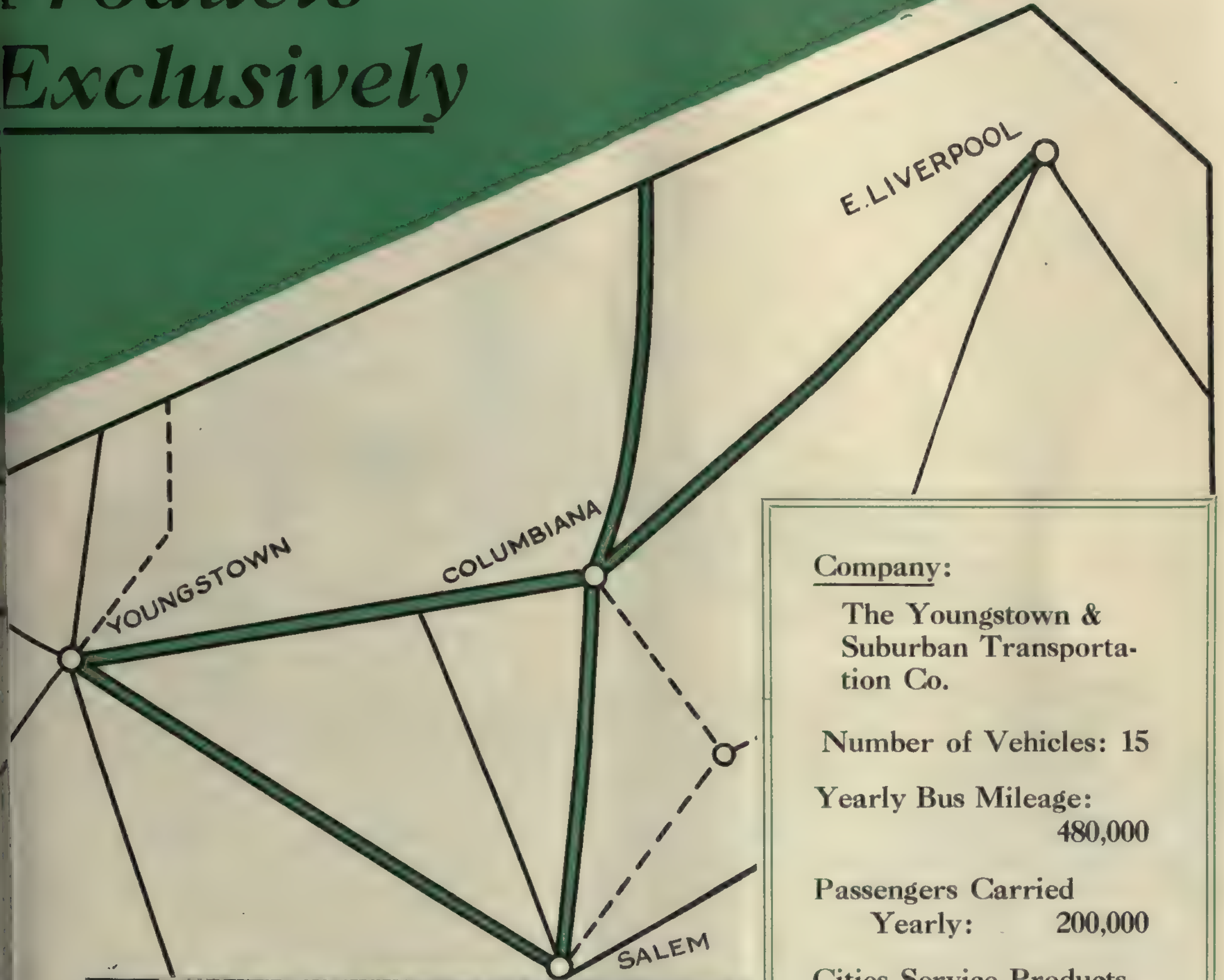
A Cities Service engineer will gladly study your bus problems and recommend the proper gasolene and lubricants for your needs.

CITIES SERVICE COMPANY

60 Wall Street **New York City**

KOOLMOTOR PRODUCTS

Travel on Cities Service Products Exclusively



Company:

The Youngstown & Suburban Transportation Co.

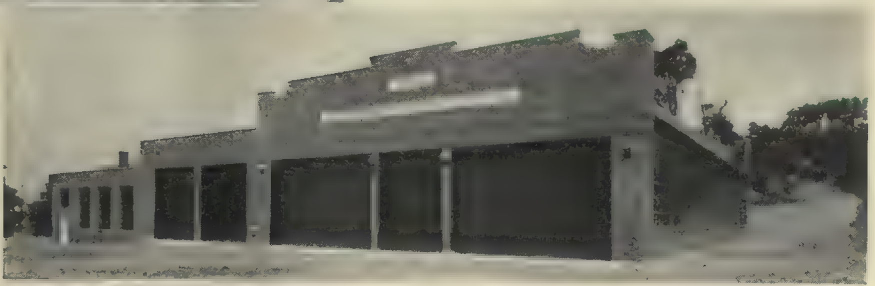
Number of Vehicles: 15

Yearly Bus Mileage: 480,000

Passengers Carried Yearly: 200,000

Cities Service Products Used:

Koolmotor Bus Oil
Cities Service Gasolene
Koolmotor Universal Grease



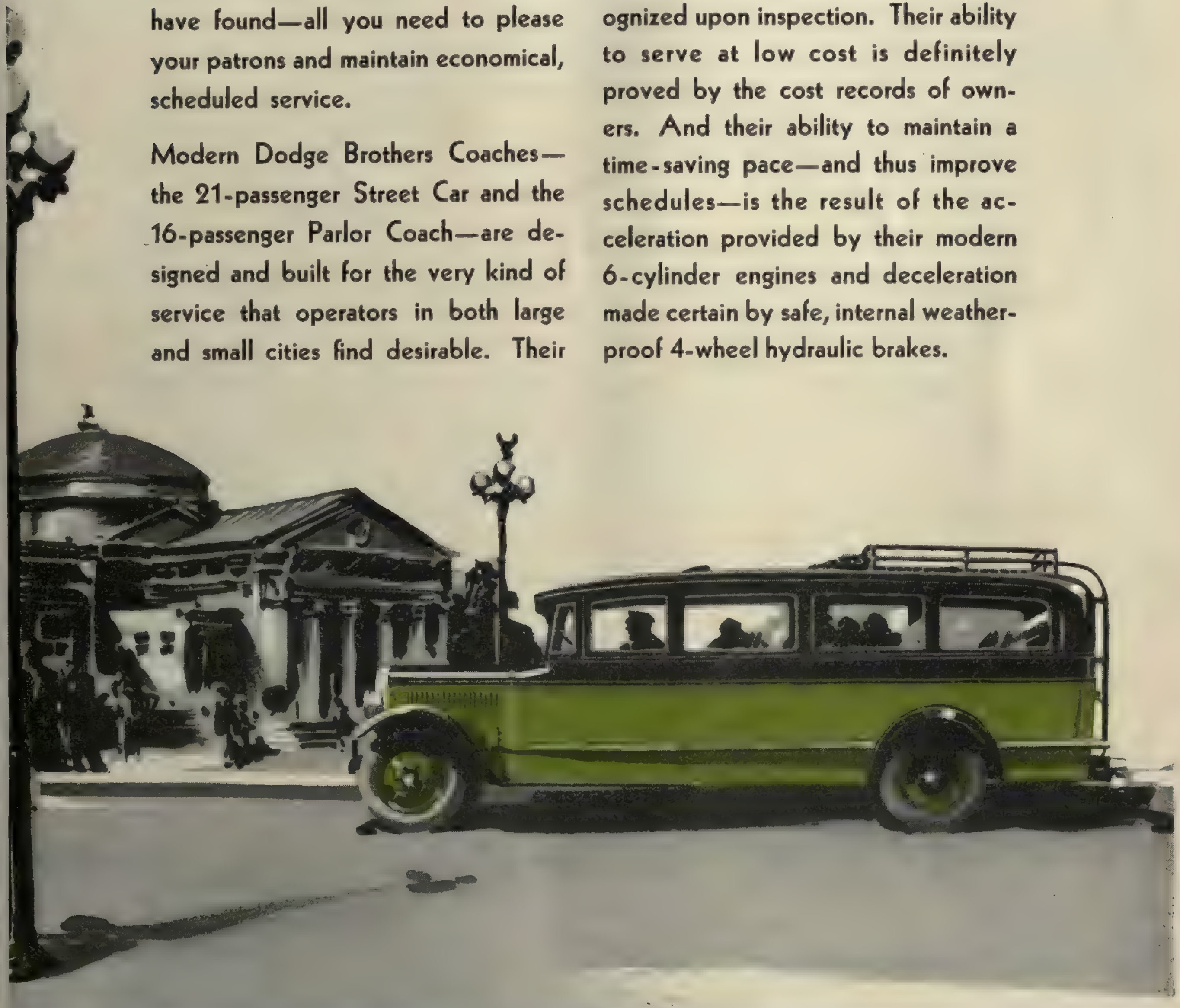
All you need—to improve

DODGE BROTHERS

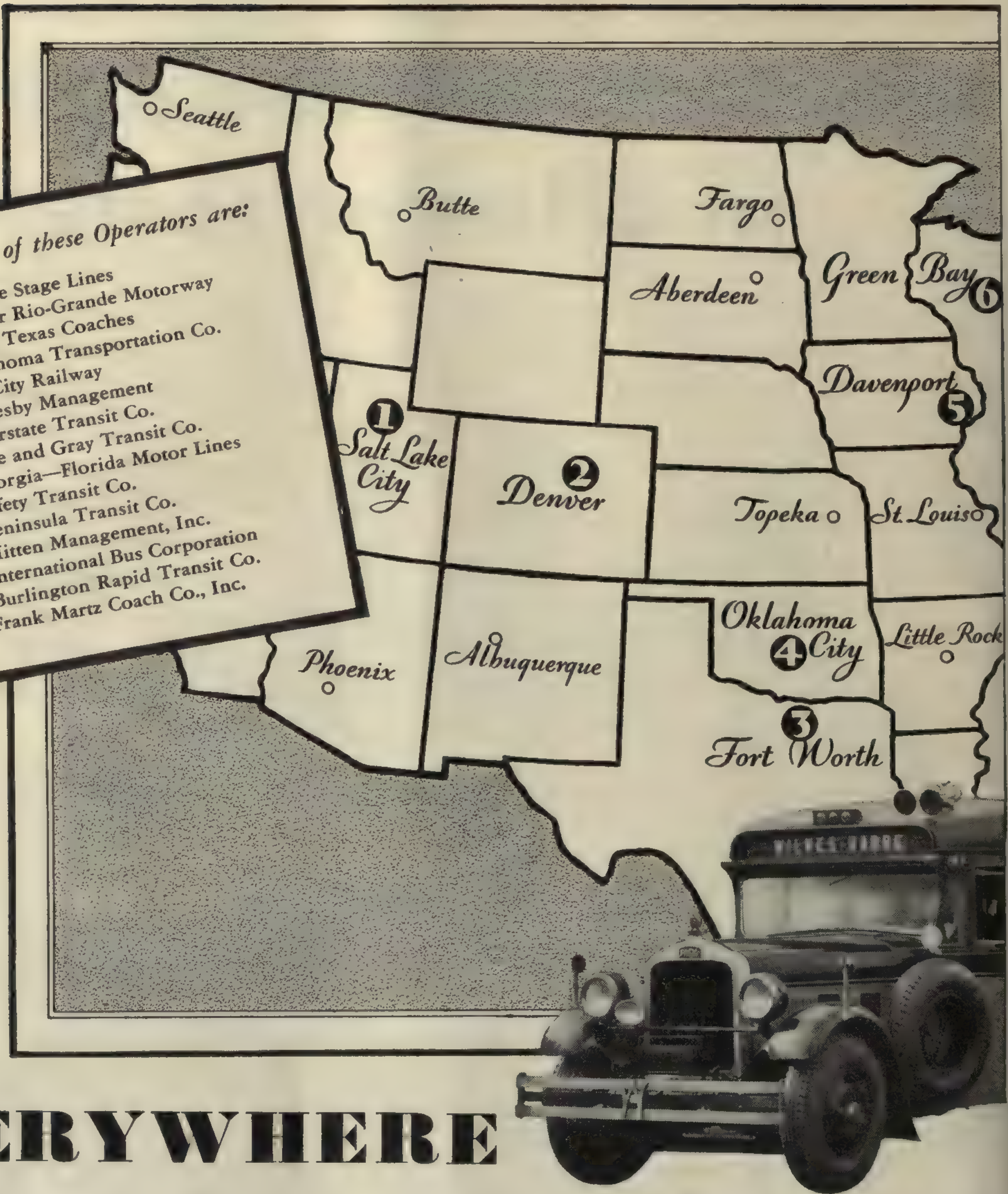
schedules, please patrons and lower costs

You will find in Dodge Brothers Motor Coaches—as other alert operators have found—all you need to please your patrons and maintain economical, scheduled service.

Modern Dodge Brothers Coaches—the 21-passenger Street Car and the 16-passenger Parlor Coach—are designed and built for the very kind of service that operators in both large and small cities find desirable. Their ability to attract patronage by their fine appearance and comfort is recognized upon inspection. Their ability to serve at low cost is definitely proved by the cost records of owners. And their ability to maintain a time-saving pace—and thus improve schedules—is the result of the acceleration provided by their modern 6-cylinder engines and deceleration made certain by safe, internal weatherproof 4-wheel hydraulic brakes.



MOTOR COACHES



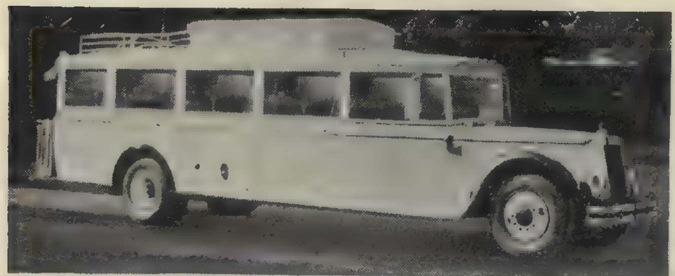
Who some of these Operators are:

1. Beehive Stage Lines
2. Denver Rio-Grande Motorway
3. South Texas Coaches
4. Oklahoma Transportation Co.
5. Tri-City Railway
6. Byllesby Management
7. Interstate Transit Co.
8. Blue and Gray Transit Co.
9. Georgia—Florida Motor Lines
10. Safety Transit Co.
11. Peninsula Transit Co.
12. Mitten Management, Inc.
13. International Bus Corporation
14. Burlington Rapid Transit Co.

★ Frank Martz Coach Co., Inc.

EVERYWHERE

bus operators, large and small, are

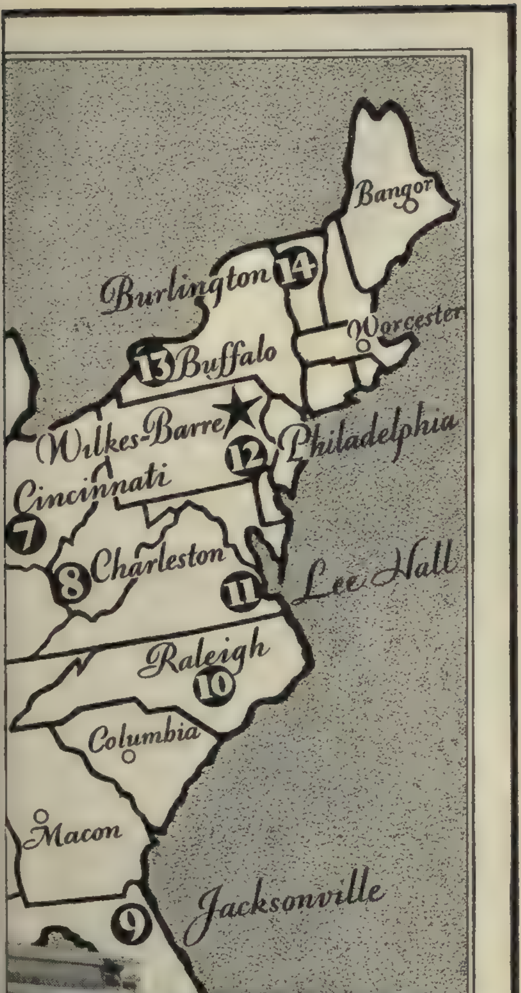


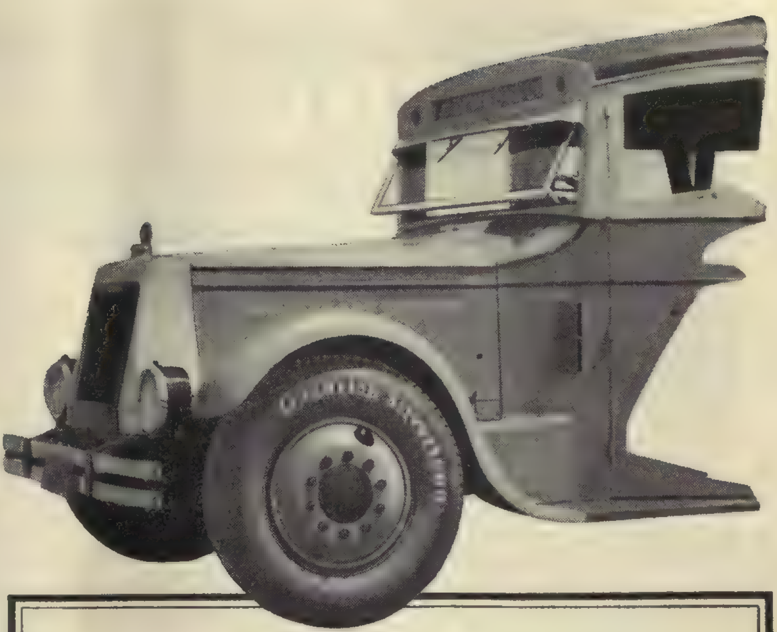
Whether you operate one bus or one hundred, Goodrich Tires and Goodrich nation-wide service will combine to offer you efficient, economical, and dependable performance.

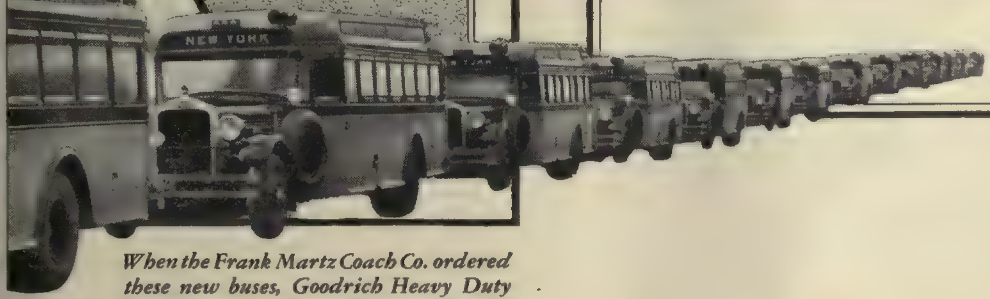
YOU, as a bus operator, demand certain definite results from the tires you use. Otherwise the operation proves inefficient and costly.

Mileage is an important factor. Flats and road delays must be reduced to an absolute minimum. The security of your passengers and equipment is a vital point. Service, anywhere you may travel, is necessary. But along with all that there is the need for real tire performance—stamina that matches power and speed, endurance that is equal to any test.

It is because Goodrich fulfills these many qualifications, point for point, that operators everywhere are saying, "in the future we intend to equip







When the Frank Martz Coach Co. ordered these new buses, Goodrich Heavy Duty Silvertown Tires were specified 100%.

What some of these Operators say:

"We have entered our fifth year on Goodrich 100%."

"Goodrich Tires have played a vital part in helping us expand our operations and maintain schedules."

"3,784,007 bus miles covered in 1929 with but 10 trips lost due to tire trouble."

"We use Goodrich exclusively and are getting the best service we ever had."

"The finest tire we know of for trouble-free mileage, uninterrupted service and low cost."

"Our mileages range from 30,000 to 75,000 per tire."

standardizing on **GOODRICH**

our buses 100% Goodrich." Here is concrete evidence—proof, here are the actual facts.

Back of the Heavy Duty Silvertown is a standardized Goodrich service, trained and experienced. These men know how to keep your buses running day in and out and running economically. See any Goodrich Truck and Bus Tire Distributor. His proposition is very specific and very interesting.

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ont.

Goodrich HEAVY DUTY **Silvertowns**

another
B. F. Goodrich Product

32,000 Different Rubber Articles · Goodrich Silvertowns · Zippers · Rubber Footwear
Drug Sundries · Soles · Heels · Hose · Belting · Packing · Molded Goods

"Canned Experience"

Make use of the other man's experience

That old saying

about experience being the best teacher is absolutely sound. But most of us recite it without thinking that experience may be of various sorts—the experience of other men as well as our own, "canned experience," if you please, ready for use. Why not take advantage of the experience of other men as far as we can and save not only years of time but many expensive lessons?

Do you know that a large share of the world's best research work in the fields of science, technology and business is contained in

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There is no additional charge for books purchased on the budget plan. The prices are the same as for cash.

1

Richey—

Electric Railway Handbook

Second Edition, 798 pages, flexible, pocket size, 528 illustrations, $4.00

A thoroughly revised reference book of practical data, formulas and tables for the use of operators, engineers and students. It gives the essential reference data on all phases of electric railway construction and operation. It presents: (1) Data on subjects which come up in everyday electric railway practice. (2) Material of service to the non-technical manager or operator. (3) Reference material on electric railway practice for those who are specializing in other or allied lines.

2

Harding—

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Third Edition, 480 pages, 6x9, 248 illustrations, $5.00

A thorough revision of this standard work on the theory and practice of electric railway engineering. The book covers the principles of train operation, power generation and distribution, equipment and types of systems.

3

Kurtz—

Lineman's Handbook

550 pages, pocket size, flexible, illustrated, $4.00

The first book written expressly for linemen, foremen, and other employees of line departments. The book meets the growing need for a pocket volume of construction and maintenance data, procedure, and methods. It presents hundreds of kinks, shortcuts, expedients and time- and work-saving methods, as well as scores of useful diagrams, tables, and formulas for the lineman.

4

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Fifth Edition, 2,100 pages, 4½x7, flexible, illustrated, $6.00

A widely-known encyclopedia of electrical engineering. The book covers every branch of modern electrical engineering. It is complete and reliable, and so carefully and fully indexed that its information is readily accessible.

5

Croft—

American Electricians' Handbook

823 pages, pocket size, 900 illustrations, flexible, $4.00

The book is a reliable, useful handbook for wiremen, contractors, linemen, plant superintendents and construction engineers. It aims to give the practical man the facts on apparatus, materials and installation which he needs in his daily work. It is practical from cover to cover.

6

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Electric Railway Transportation

Second Edition, 437 pages, 6x9, 121 illustrations, $5.00

A second edition of this widely known book on the transportation side of the electric railway business — getting the cars over the tracks — increasing the traffic — collecting the fares — and selling service in the face of modern conditions. Particular consideration is given to the place of the bus in modern transportation.

7

King—

Railway Signaling

369 pages, 6x9, 340 illustrations, $4.00

A completely adequate book on all phases of modern railway signaling. The book describes fully the construction, installation, operation and maintenance of signaling equipment, and presents a thorough discussion of principles.

8

Nash—

Economics of Public Utilities

413 pages, 6x9, $4.00

This book presents the essential facts and the most mature views upon the underlying financial and economic phases of public utility companies with particular emphasis on electric railways, electric light and power companies and gas companies.

It discusses every angle of the public utility *as a business* and treats thoroughly such subjects as capitalization, investment features, franchises, regulation, valuation, depreciation, taxes, rates, service, accounting methods, public relations, etc.

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PIONEERS

EACH age has its pioneers, men with vision and the will to push on. High in this tradition were the 49'ers, at the end of whose trail the Industry convenes this year.

High in this tradition, too, are the captains and lieutenants of industry, agriculture, trade and transportation, the builders of the great cities, and the developers of the fair countryside of the West.

In this winning of the West, the Electric Railway played a most important part when steel rails replaced wagon ruts and villages grew to townships and cities.

Growing up with the Electric Railway Industry, Collier Service has standardized car advertising space and stabilized car card space values, and has maintained them as a reliable asset to operating companies from Coast to Coast.

BARRON G. COLLIER
INCORPORATED
NEW YORK

CAR CARD ADVERTISING ALMOST EVERYWHERE

A Comfortable, uninterrupted ride

is the best method a traction company can employ in overcoming automobile competition. Attractive car service removes the incentive for the motorist to provide his own transportation—especially in view of the ever-increasing difficulties of parking.

Riding comfort begins with the track. Carnegie Steel Cross Ties provide the foundation for a smooth, repair-free track—a track that saves wear and tear on rolling equipment and greatly enhances its comfort—a track providing long, continuous service. Carnegie Ties are easily installed. The bolt and clip by which the rail is secured are simple and efficient. The unit cost (cost per foot of track per year) is considerably less than for wood ties. Carnegie Steel Cross Ties will prove a profitable investment—particularly from the standpoint of passenger satisfaction . . . New booklet on request.

◆

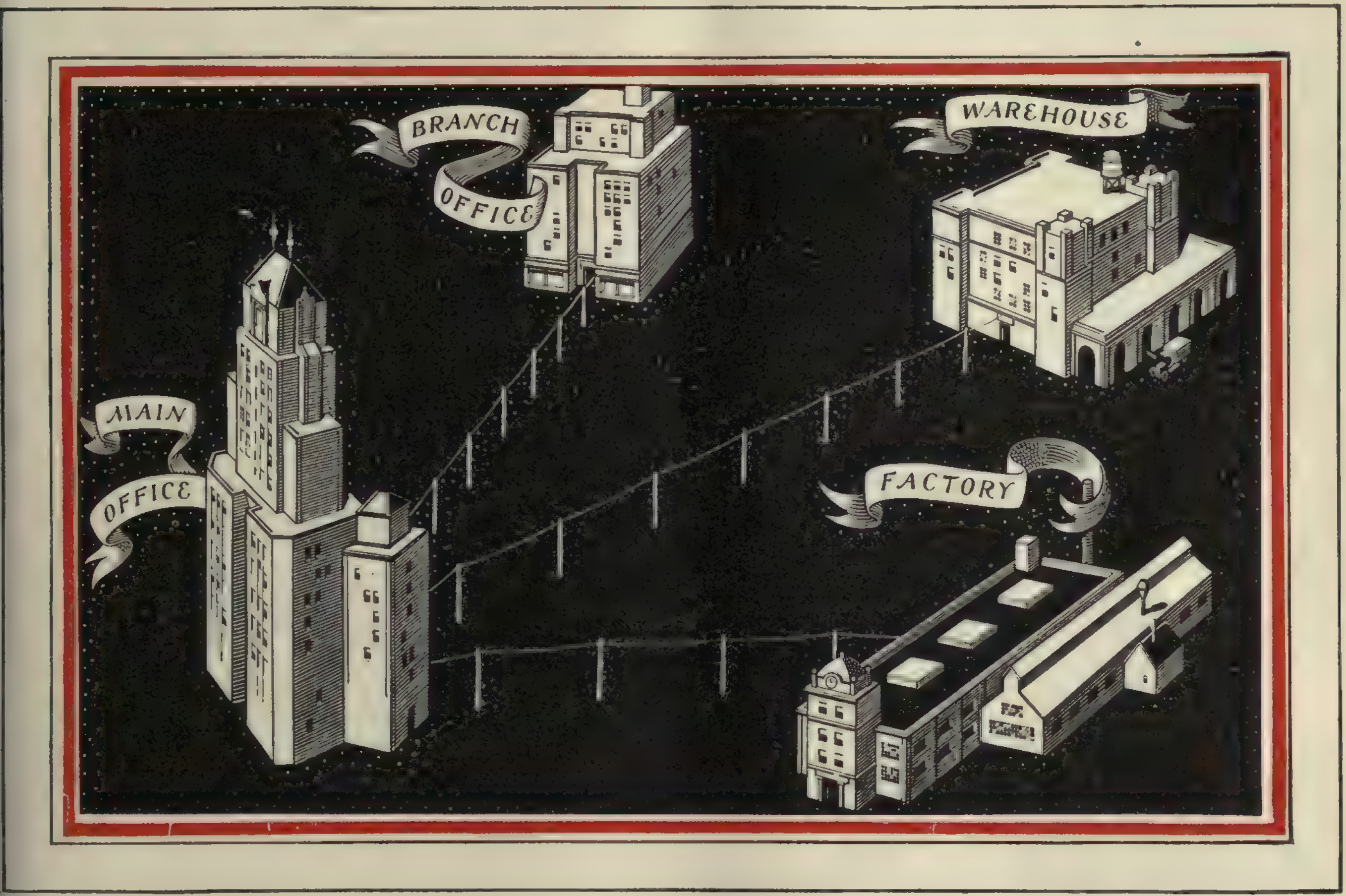
Carnegie Steel Company - Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

61

CARNEGIE
STEEL CROSS TIES

Cut costs... Speed business with Telephone Typewriter Service



Telephone Typewriter Service makes possible the complete co-ordination of every department of a business, no matter how widely separated its various branch offices, warehouses, factories, or other units may be.

It provides quick, accurate and continuous *two-way typewritten communication*. A message typed at one office is reproduced instantly and identically in all connected offices.

A machinery corporation uses Telephone Typewriter Service to transmit orders, production reports and administrative messages between its headquarters office and four distant factories.

A blanket manufacturing concern uses it to give its customers speedier service. Orders are shipped from its Rhode Island mill the same day they are received at the New York office. Cancellations or changes are transmitted without delay. Office routine is simplified, orders being handled only once where formerly they were handled three or four times.

Telephone Typewriter Service is of value to small firms as well as large. Expensive duplication in operating details is eliminated, production curves smoothed out, deliveries speeded. Your local Bell Telephone Business Office will gladly make a survey of your communication needs and show you where this service will reduce costs.

the NEW a.c.f.

SERIES 45 BUSES

ARE EQUIPPED WITH

LONG CLUTCHES

AND RADIATORS

LONG MANUFACTURING
COMPANY, Detroit, Michigan

LONG

LONG PRODUCTS
AUTOMOTIVE CLUTCHES AND RADIATORS

a.c.f.

a.c.f.'s Record on the Morris County Division of Public Service Coordinated Transport

June 15, 1926 . . . . . . 5 a.c.f. coaches

Today . . . . 50 a.c.f. coaches

June 15, 1930 . . . . . . 70 a.c.f. coaches

3,014,768 miles run in 1929 in 228,652 bus-hours

June 15, 1926, the Morris County Division of Public Service started its motor coach operation with five A. C. F coaches. In a little less than four years these five coaches have run up mileages of from 230,000 to 250,000 each. They are now just having their first complete overhaul. One has been put back in service, as good as new. Three others are just about to go back on their runs, and the fifth is still in active use—outpulling most other buses on one of the toughest runs in this section of the country.

Since this original purchase Public Service has added 45 A. C. F coaches to the Morris County Division. It has operated these over a route that includes every type of operating conditions. Dense city traffic. Scheduled service for long distance riding. Local peak-loads, meeting dozens of commuters' trains morning and evening. Difficult grades. Holiday and summer resort crowds. And high mileage. All these conditions demand a rugged dependability.

Only equipment capable of meeting the whole range of transportation conditions could answer Public Service's requirements. Four years' experience has led the Morris County Division of Public Service to a concentration on A. C. F exclusively. And A. C. F's record through these years is the reason why they are now taking delivery of twenty more A. C. F coaches—the magnificent 33-passenger. Series 40 A. C. F parlor car type shown on the last page of this insert.

a.c.f

Series 40 A.C.F parlor car. One of 20 just being delivered to Morris County Division of Public Service.

Inner reasons why this A.C.F model P-40 gives such all-round performance • A. C. F Hall-Scott coaches are so fundamentally "right" that only a careful detailed comparison can bring a full realization of their real value and earning possibilities. Only concentration on the true requirements of bus service could develop features which A.C.F offers, of which the following are typical.

A powerful, economical, extremely accessible Hall-Scott engine, developing 120 h. p. The one universally recognized bus engine of today. A background of six years of constantly satisfying performance without a deviation of original fundamental design : : : A clutch and transmission especially designed for A.C.F equipment, capable of taking full advantage of the tremendous power available under all operating conditions.

A chassis designed to meet a pre-determined passenger load requirement, giving maximum payload area back of the cowl without a sacrifice elsewhere; entire engine located forward of cowl; overall chassis height held to 24″, at the same time utilizing advantages of straight front chassis frame.

Swivel rear spring shackles, providing necessary flexibility occasioned by body roll, without the usual stress to rear springs and chassis cross-members.

Front springs designed to fully utilize recognized advantages of air-springs, which are designed as a basic part of the chassis—not fitted or adapted later.

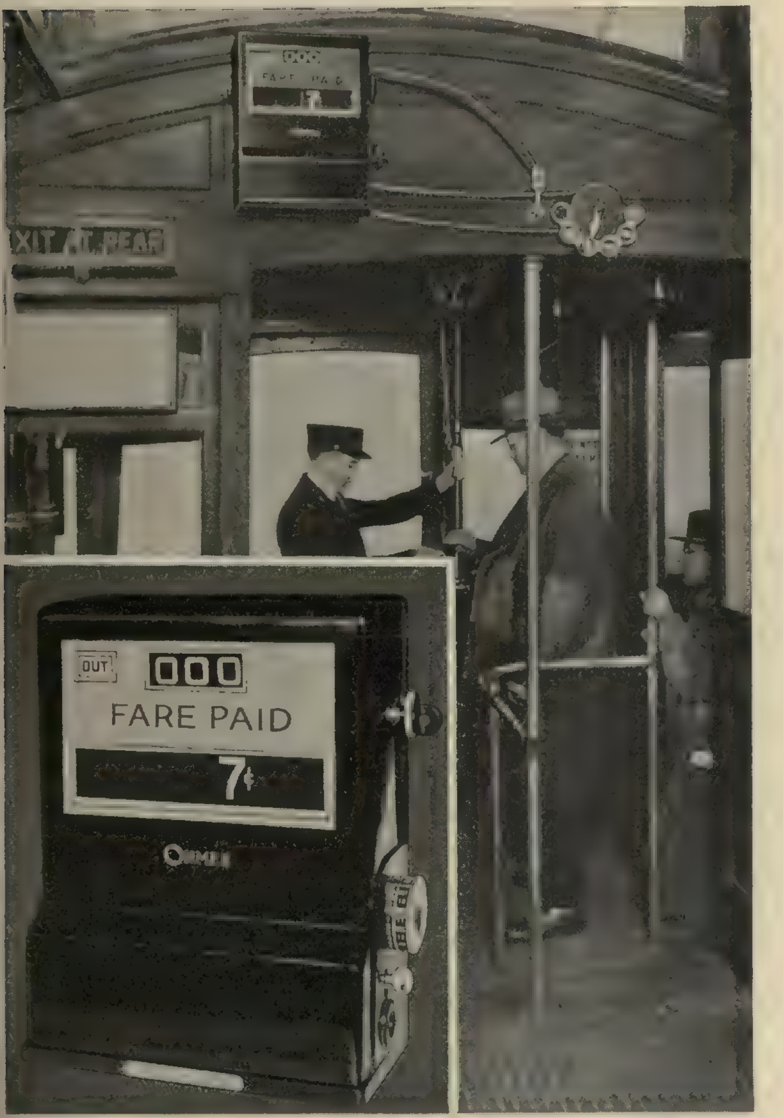
Brake drums designed and cast of special Car-Foundry Alloy, overcoming for the first time one of the major problems in bus manufacture, by providing 100% efficient brakes, but at the same time with satisfactory life from the operating standpoint.

Practically all A.C.F equipment built entirely within A.C.F shops, including engines, bodies and chassis, giving you the benefit of 100% A.C.F responsibility and service : : : A.C.F coaches available in capacities up to 40 passengers, for urban, and intercity service, powered with engines from 80 to 175 actual h. p.

AMERICAN CAR AND FOUNDRY MOTORS COMPANY · · 30 CHURCH STREET · · NEW YORK CITY

New A.C.F Chassis with Hall-Scott, 120 h. p. engine, of type being delivered Public Service Coordinated Transport.

NOW the case is new!



Here is the OHMER No. 3 Register with new casing. This register can be furnished with 3 to 6 classes of fare. It produces a printed, detailed record of Time, Direction, Number of Fares of each class registered, Register Number and Conductor's Number. Send for further details.

The OHMER No. 3 Register, favorite for thirty years, conforms to modern car interiors

THE OHMER No. 3 Register is brought up-to-the-minute. Now it is as modern in looks as it is in operation!

The No. 3 has been a favorite register for more than thirty years. From time to time slight improvements have been made in order to meet the changing conditions in the transportation industry. But in all these years no *major* alteration was made . . . because none was found necessary. It has proved itself successful in design, mechanical simplicity and construction.

Keeps its Popularity!

One thing, more than any other, demonstrates the built-in value of the OHMER No. 3 Register . . . the popularity it enjoys. Renewal contracts, calling for a large number of No. 3 registers, have just been received.

Of our recent new contracts for No. 3 registers, 146 go to the Des Moines Railway Company . . . 37 to the Alabama Power Company . . . and 105 to the Indianapolis Power Company.

The Register for you

This is the type fare register you want on your cars today. It is remarkably good looking and conforms to modern car interiors. It is easy to install, gives no trouble, requires surprisingly little servicing and lasts indefinitely.

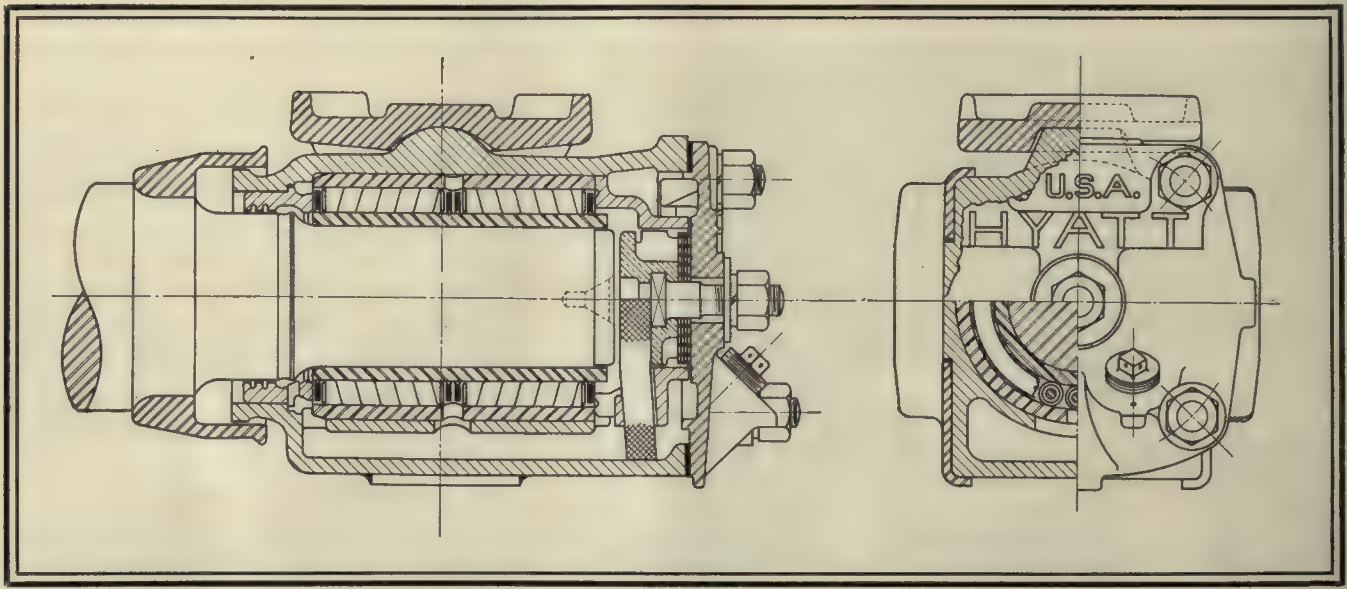
Get all the Facts

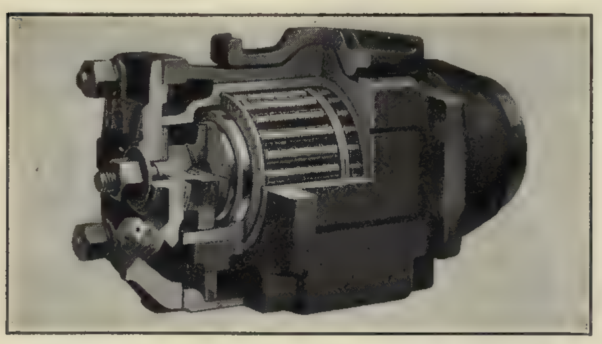
Let us give you all the facts about this remarkable register and other OHMER Registers. Let us explain how they will meet the requirements of *your* business exactly. Simply write and tell us the number of cars or buses you operate and the classification of your fares, and we will send a detailed account of how OHMER Registers will save and earn you money. Sending for this information involves no cost or obligation whatever. Write today.

OHMER
REG. U.S. PAT. OFF. AND OTHER COUNTRIES
FARE REGISTER COMPANY
Dayton, Ohio, U. S. A.

. . . of interest to Mechanical Department Executives

Hyatt Roller Bearing Journal Boxes will eliminate the item of bearing trouble from your pull-in record and effect a considerable saving in the cost of routine maintenance. Less frequent inspection is required by a Hyatt bearing because it's practically wear proof and because it uses so little oil. Replacements of bearings and stores kept for this purpose are eliminated, less lubricant is used and no packing waste.





Hyatt Roller Bearing Journal Box, designed to reduce maintenance cost and to increase the riding comfort of passengers.

Hyatt bearings reduce starting torque, save power and prevent damaging strains on the motor and driving gears. Consider them for your equipment, in the interest of general efficiency and economy.

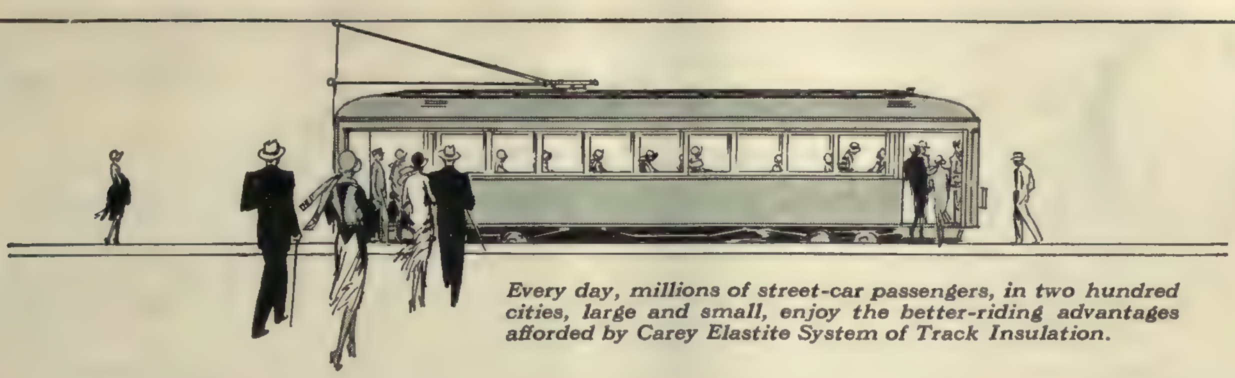
HYATT ROLLER BEARING COMPANY

Newark Detroit Chicago Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

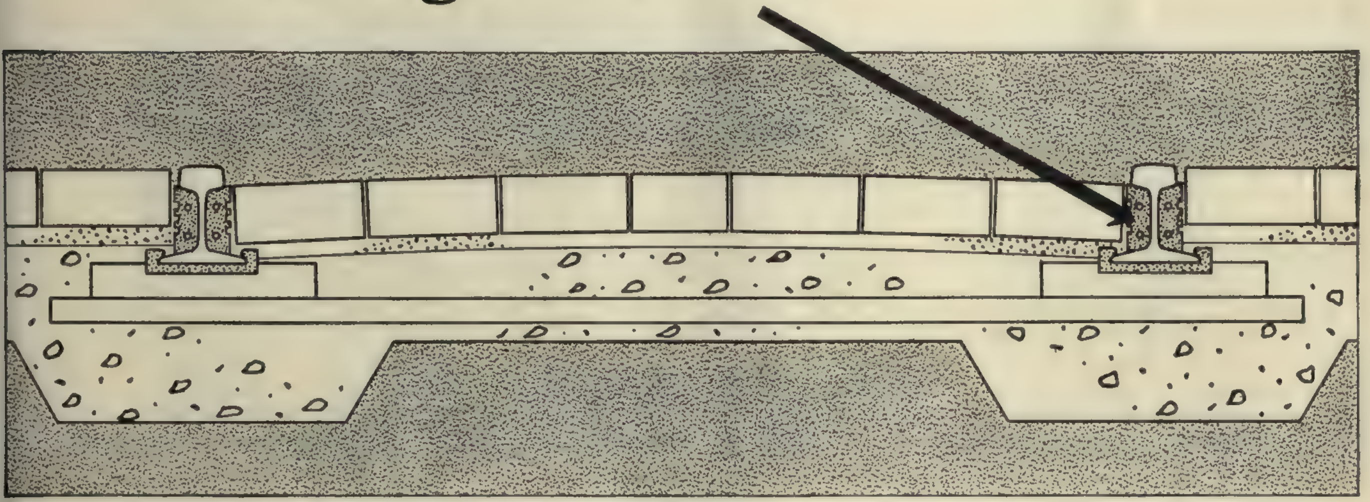


Every day, millions of street-car passengers, in two hundred cities, large and small, enjoy the better-riding advantages afforded by Carey Elastite System of Track Insulation.

It cushions the impact of traffic

It reduces vibration of the rails

—and it forms a water-tight seal right there!



Showing the installation of Carey Elastite System of Track Insulation . . . extra years of service for the track and its surrounding pavement.

When you install Carey Elastite System of Track Insulation, you add years to the life of the track and its surrounding pavement. For this modern improvement reduces vibration and rail corrugation. It retards corrosion—keeps out frost and water. It muffles track noises, insures more comfortable riding, speeds up traffic. Finally, it is an absolute guaranty of lower up-keep cost.

THE PHILIP CAREY COMPANY
Lockland, CINCINNATI, OHIO

Carey
REG. U.S. PAT. OFF.
Elastite
TRADE MARK REG'D. U.S. PATENT OFFICE
SYSTEM OF
TRACK INSULATION

One issue....

of the Electric Railway Journal NEWS

To supplement the Electric Railway Journal monthly magazine—a copy of which you have in your hands—we publish the Electric Railway Journal NEWS. This separate newspaper appears on thirty-nine Saturdays during the year.

From a hundred points in the U. S. and Canada, correspondents speed the news of fare changes . . court decisions . . legislative acts . . news that is accurate and vital. Fast as telegraph wires and air mail bring the news, it is set into type. And fresh from the presses comes the Electric Railway Journal NEWS to alert men.

Below is a typical table of contents. Glance over it. See how many of these news items you missed. Then make certain that you receive every issue of the NEWS. Subscribe by mailing in the coupon below—no money till you're billed.

Headlines in a typical issue of your field's newspaper

Fares Increased in Detroit

Whalen Acts to Prevent Taxi Rate War in New York

Elevated Fare Case Before New York Courts

$325,000 for Trackless Trolleys in Seattle

Progress on Bus Bill

Boston "L" Does Well

No Need for Rapid Transit in New Orleans Now

$60,000,000 Spent for I. C. Electrification at Chicago

Omaha Safety Campaign Success

Be Open and Bold About Publicity

Rift in Chicago Financial Plan

Associated Gas Explains Its N. Y. State Purchase

20 New Cars for Indiana Road

$850,000 Car Order by North Shore

New Indianapolis-South Bend Service Proposed

Enter Your Ads in Transportation Contest

Promoting Good Will

Sale of East Texas Interurban Line

Court Holds Procedure in N. Y. Fare Cases Improper

United Railways of Baltimore Resumes Sale of Tokens on All Lines

ELECTRIC RAILWAY JOURNAL
Tenth Ave. at 36th St., New York

Kindly enter a year's subscription to the Electric Railway Journal NEWS, the newspaper of my field. Send me your bill for $2 later on.

Name. . . . .

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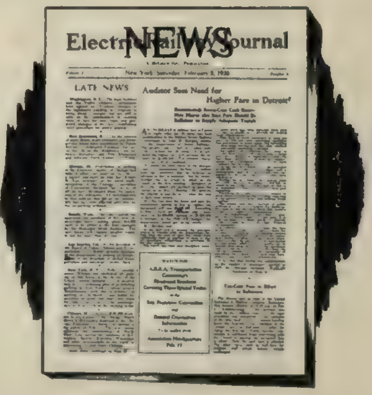
City. . . . . *State*. . . . .

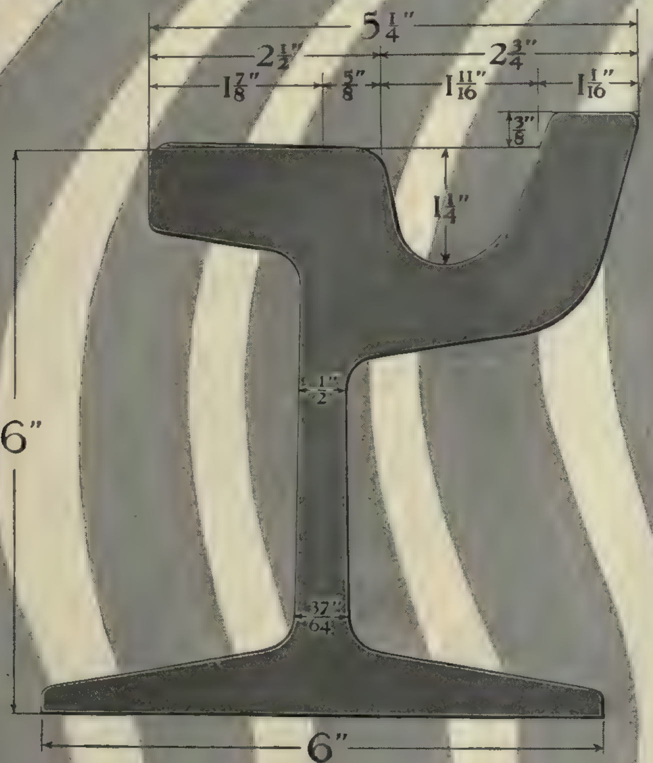
My Company. *My Position*. . . . .


Electric Railway Journal NEWS
LATE NEWS
Auditor Sees Need for Higher Fare in Detroit

Consider it for Curves

Girder Guard

Section 122 No. 539



THIS rail was first suggested and subsequently designed principally for use in connection with 6-inch tee rail track on curves. It has evident advantages as an alternative for tee rail guard with necessary appendages including separators, joint chocks, etc. It is also often used instead of rolled shaped guard with its appendages. Neither the tee rail guard nor the rolled shaped guard has proven as satisfactory under certain traffic conditions, as our Section 122 No. 539.

The use of this girder guard section is not confined entirely to curves, as it is equally desirable with tee rail turnouts, branch-offs, etc., which require guarding on the inside rail or opposite frogs We recommend your consideration of this rail for these specific uses.

Weight: 122 pounds per yard

THE LORAIN STEEL COMPANY

JOHNSTOWN, PA.

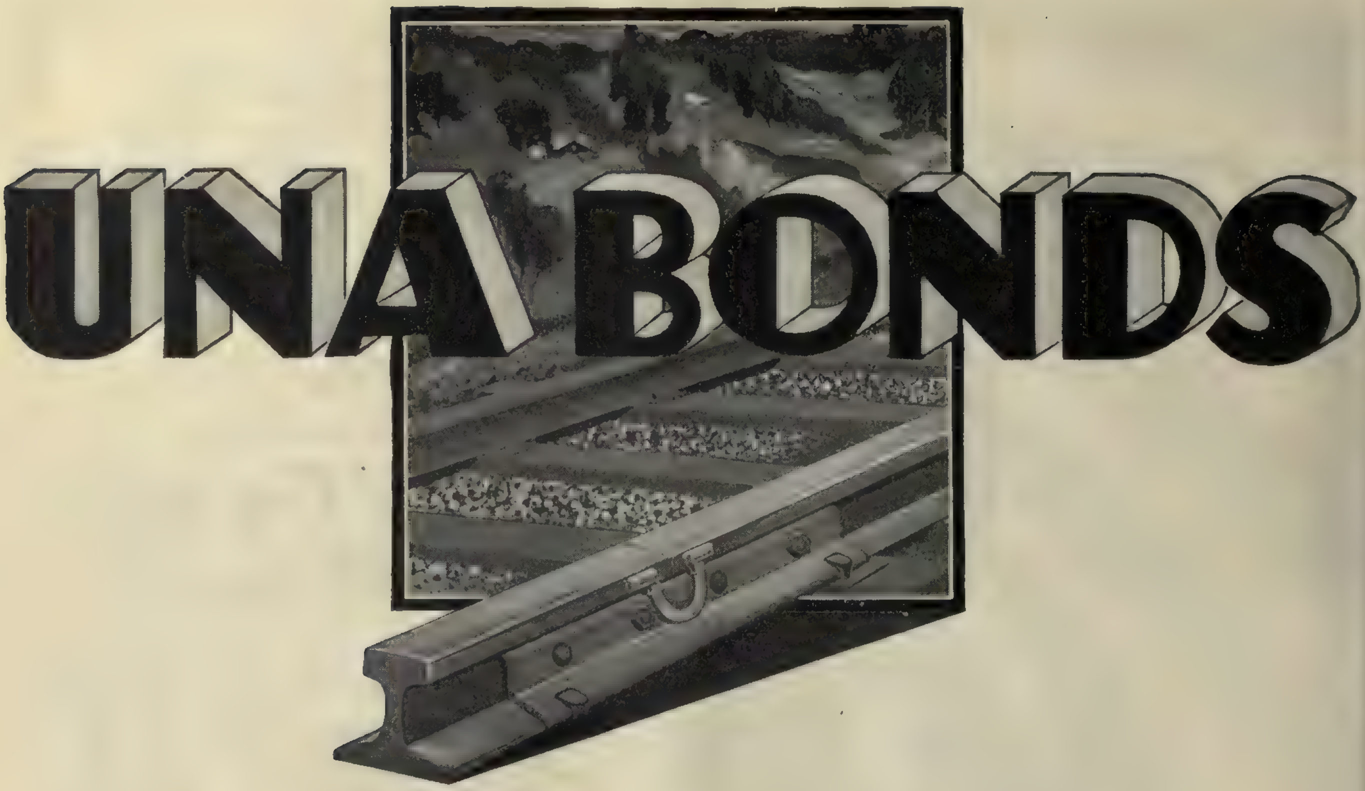
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL ATLAS CEMENT COMPANY

Pac. Coast Distributors—United States Steel Products Co. Columbia Dept., San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Co., New York City

LORAIN SALES OFFICES— Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh



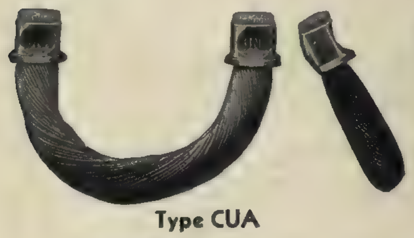
For Dependable Service at Less Cost

Users of Una Bonds, made by the American Steel & Wire Company, know that this source of supply assures unvarying quality and perfect service.

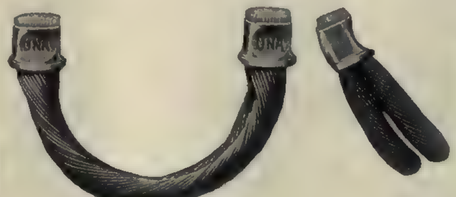
Thus—by standardizing on American Steel & Wire Company Una Bonds, leading roads assure uninterrupted schedules and lower maintenance costs.

Easy to weld—the molten metal alloys itself with the steel—a Una bonded rail will pass the standard drop test. By using our Duron Welding Wire, a solid homogeneous union of great strength results.

A complete line of carbon molds and accessories is also available. Our engineers are at your service regarding special applications.



Type CUA



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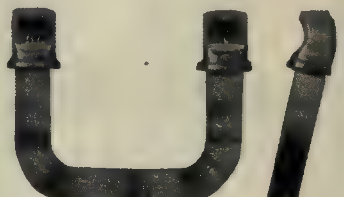
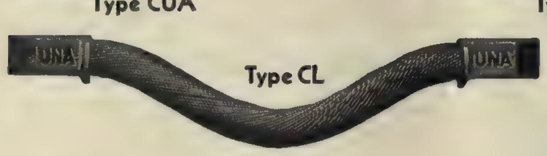
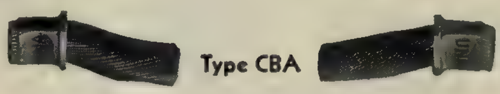


Type LUA



Type CL



Type CBA

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY UNITED STATES STEEL CORPORATION

208 S. La Salle Street, Chicago
30 Church Street, New York

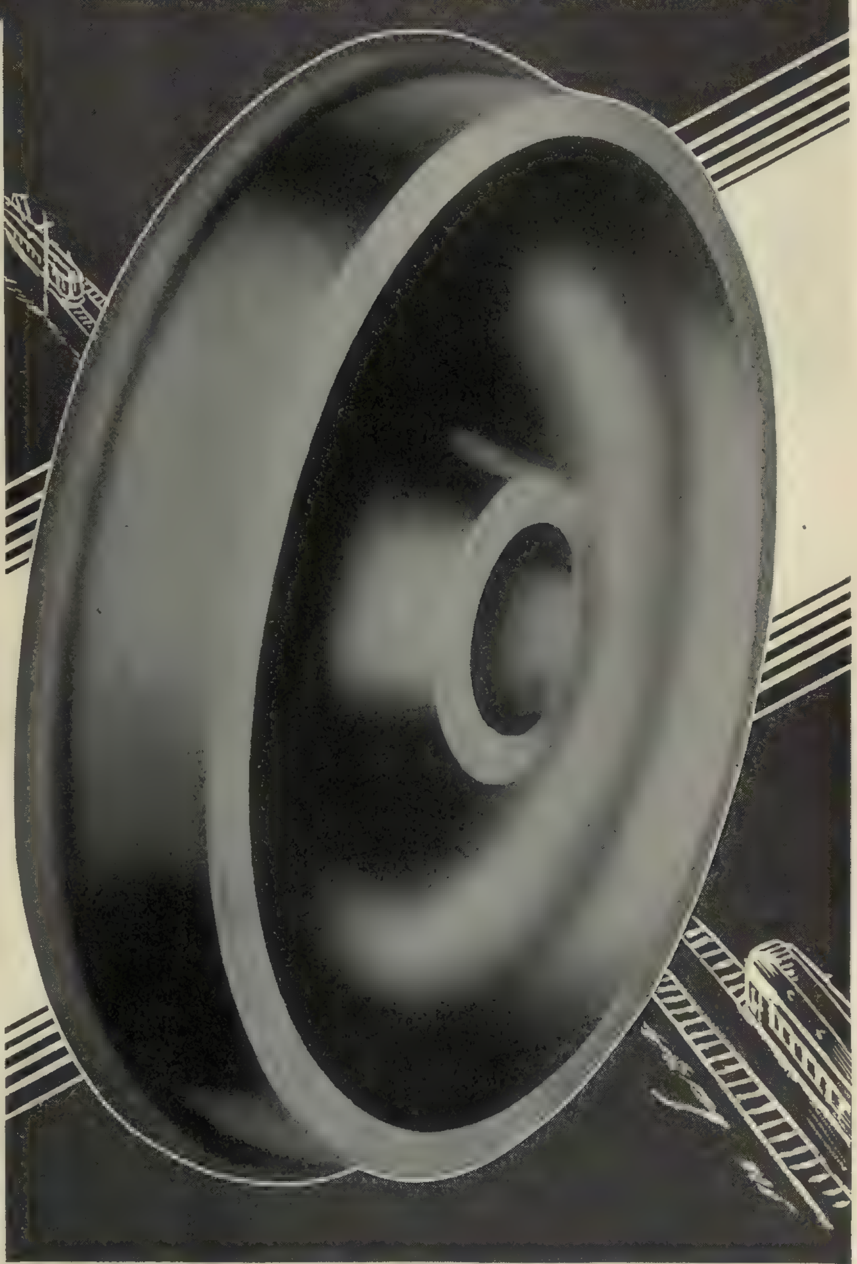
Other Sales Offices: Atlanta Baltimore Birmingham Boston Buffalo Cincinnati Cleveland Dallas Denver Detroit Kansas City Memphis Milwaukee Minneapolis-St. Paul Oklahoma City Philadelphia Pittsburgh Salt Lake City St. Louis Wilkes-Barre Worcester

U. S. Steel Products Co.: San Francisco Los Angeles Portland Seattle Honolulu

Export Distributors: United States Steel Products Co., 30 Church St., New York City

GARY

WROUGHT STEEL WHEELS



. . . . are manufactured to meet the requirements of A. R. A. and A. E. R. A. standard wrought steel wheel specifications.

Wheels are given rigid inspections at each step in the process of manufacture, insuring to the railroads a wheel that gives *safety, dependability* and *economy.*

Our Wheel Engineers are at your Service.

Illinois Steel Company
Subsidiary of United States Steel Corporation
General Offices:
208 South La Salle Street
Chicago

ALL THAT GOOD WHEELS SHOULD BE

Control*

...the most essential asset of any fare system

Properly designed tickets and transfers are absolutely essential for control. Take transfers, for example:—

TIME: Either the P.M. coupon or one of the tear-off forms is an instantaneous key to time control.

PRIVILEGES: Color, coupons, bar designs, skeleton lettering, IN or OUT forms, all are signals controlling proper use according to lines, transfer points, direction, car to bus, re-transfer and like privileges.

DATE: More and more properties are adopting Daily Dating to control abuse and to control loss of time in issuing and collecting.

AUDITING: Accurate numbering is the auditor's best control. Carelessness, errors and unknown leaks often can be caught only through the numbering control.

Most Executives recognize that Globe has specialized in the design and production of tickets and transfers for more than half a century. They seek our advice on important fare control questions. Why not you?

****CONSULT US FOR POSITIVE NUMBER CONTROL***

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TICKET COMPANY

112 North Twelfth Street
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Philadelphia
Los Angeles
Boston
New York
Jacksonville

Offices
Syracuse
Baltimore
Cincinnati
Cleveland
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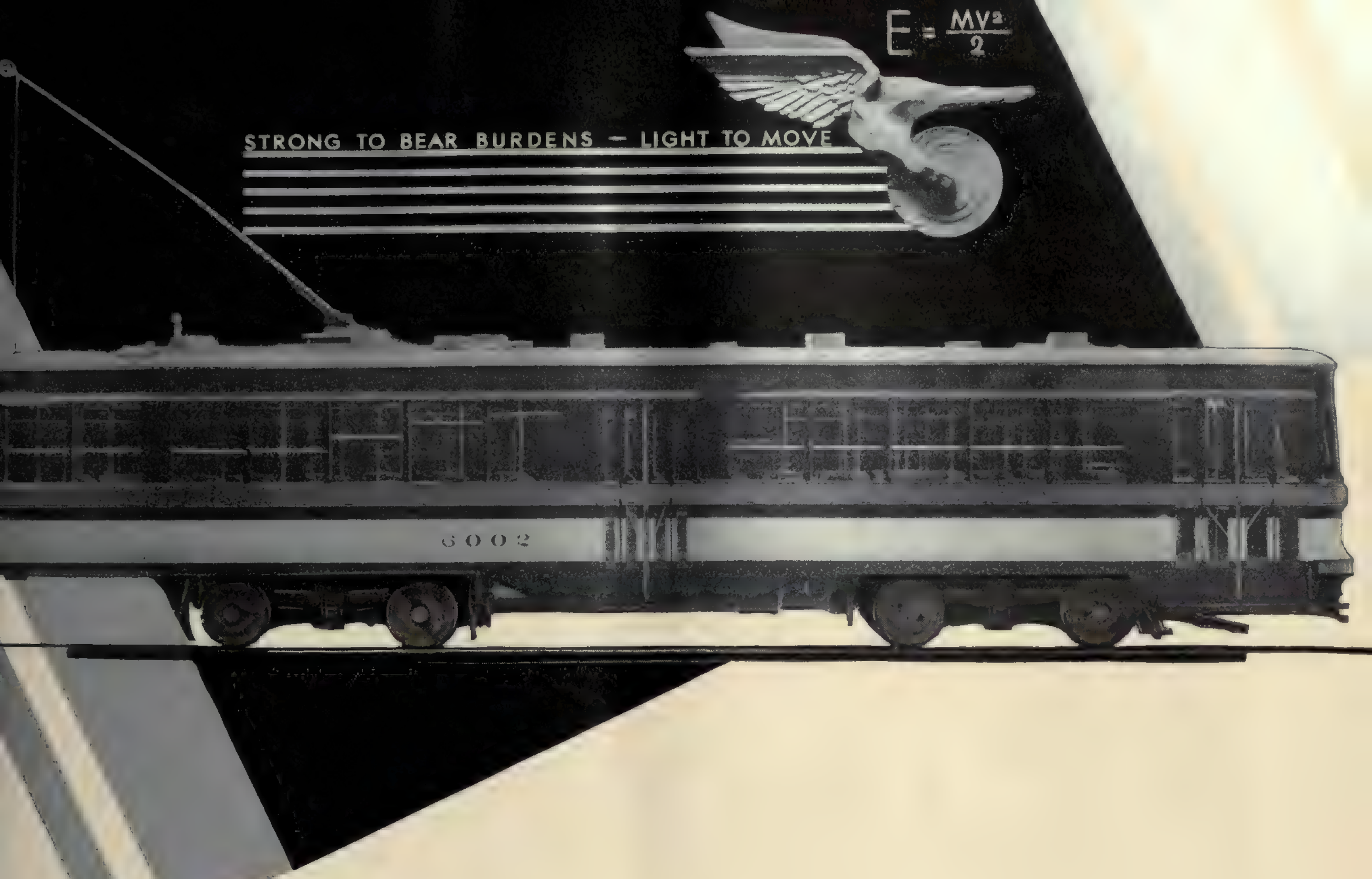


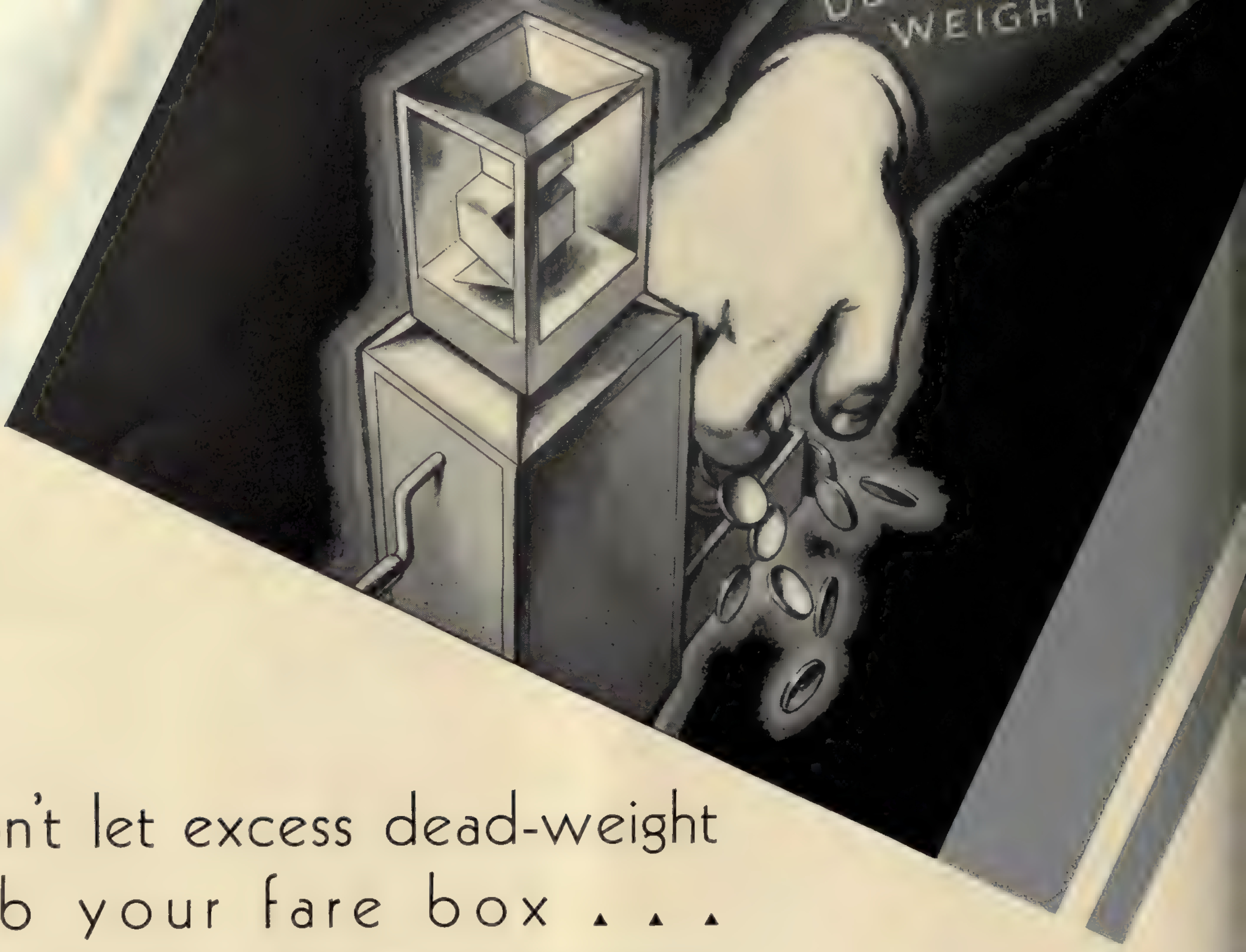
USED,,
3325 lbs. of Alcoa Aluminum
SAVED,,
7863 lbs. of dead-weight

When the Osgood Bradley Car Corporation built this car for Pittsburgh Railways Company, the specifications called for pleasing appearance, quiet operation, more comfort; in other words, a better and more luxurious street car that would be deserving of the public's patronage. It was also specified that the car must be handled readily and efficiently with the minimum loss of time for starting and stopping.

To meet such specifications a general use of Alcoa Aluminum Alloys was employed—3325 pounds of it with a net saving in dead weight of 7863 pounds.

A new and attractive color scheme was obtained by using aluminum in its natural finish for trim, and painting the car green and black. Our representatives will be glad to consult with you on the practical application of Alcoa Aluminum strong alloys in street car transportation. ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM



Don't let excess dead-weight rob your fare box . . .

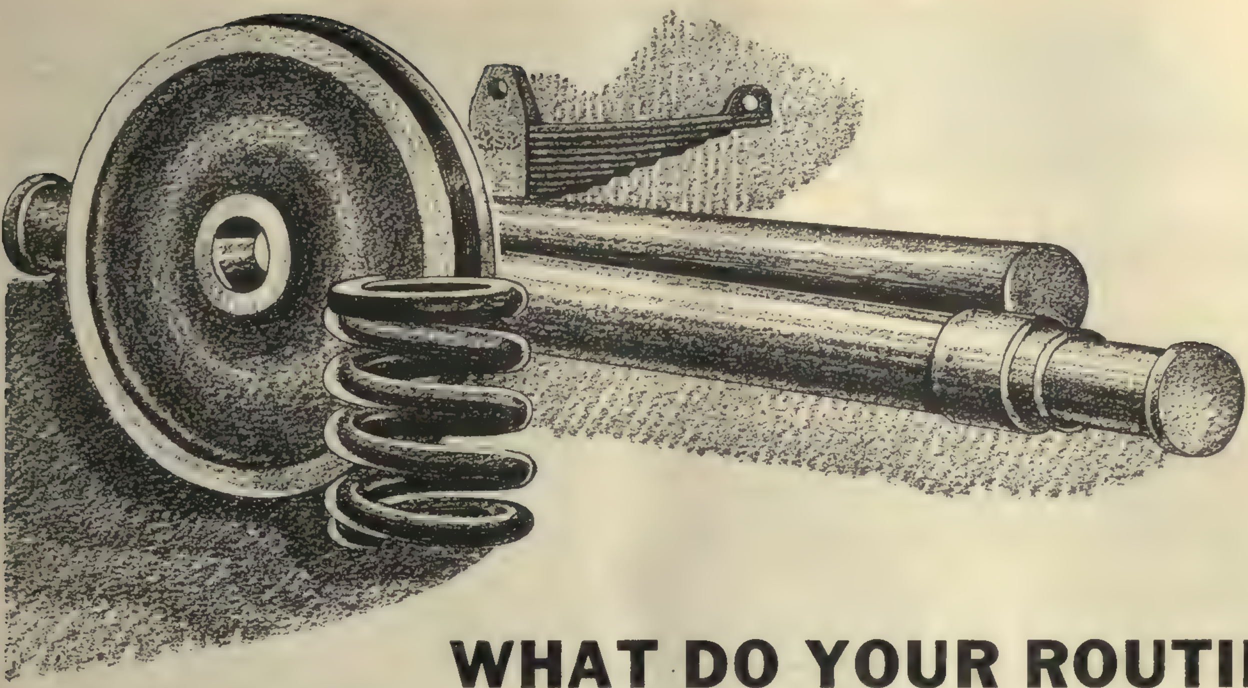
A big percentage of the coins dropped into most street car fare boxes now go to pay for hauling excess dead-weight. By cutting down surplus dead-weight, many traction companies are now turning these losses into profits.

As much as 8,000 pounds surplus dead-weight has been cut from a single car by the use of the light, strong Alloys of Alcoa Aluminum for underframes, bodies, trucks and parts of motors, controls and accessories. Cars minus this vast amount of dead-weight naturally bring power savings. With 8,000 pounds less to start, stop and move, it is possible to install lighter, less expensive motors, or to increase speeds and make extra trips.

Light weight cars, built of the light, strong Alloys of Alcoa Aluminum, are not only cheaper to operate but they are actually drawing business to car lines. They are more comfortable to ride in. There is less vibration, less noise. They run more smoothly, start and stop with less of a jerk. In short, cars built of the light, strong Alloys of Alcoa Aluminum help remove many of the ancient prejudices against street car travel.

Our representatives are always ready to cooperate with you and to give you full information on the uses of Alcoa Aluminum in street car transportation. ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM



WHAT DO YOUR ROUTINE INSPECTIONS REVEAL?

Flat wheels and chipped flanges, sprung armature shafts and lifeless springs do not improve the earning power of electric railways. Quick starts, sudden stops, high speeds and the insistent demand for more and better service make rugged parts more essential than ever before.

"Standard" Wrought Steel Wheels, Armature Shafts and Steel Springs are giving reliable and economical service in the grind of today's traffic.

STANDARD STEEL WORKS COMPANY

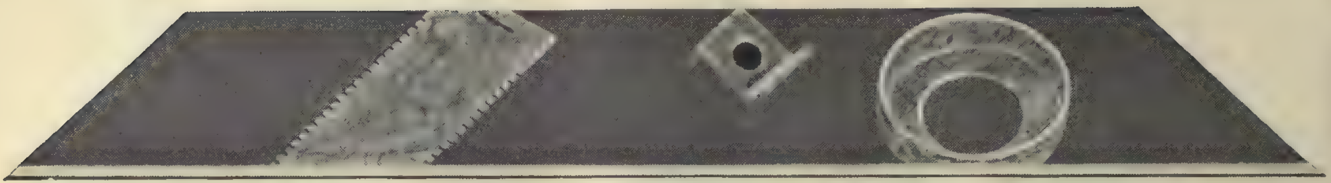
GENERAL OFFICES AND WORKS: BURNHAM, PA.

Products

Steel Axles Steel Springs Armature Shafts Rolled Steel Wheels

SALES OFFICES:

New York Chicago St. Louis Richmond Portland San Francisco Philadelphia, Pa.



Moulded and stamped with micrometer accuracy to any size and shape

THOUSANDS of shapes in thousands of sizes are being formed from Micanite, the original built-up mica insulation. Motors, generators, control apparatus, instruments, electrical heaters and similar devices are being protected by the outstanding characteristics of this age-resisting electrical insulation.

Micanite possesses great resistivity, physical strength and chemical stability. It has, in addition, the property of being readily stamped or moulded from sheets, into any desired form. Tolerances are held to micrometer accuracy.

The illustrated Micanite shapes picture the scope of this electrical insulation. Tubes 130" in length and 10" in outside diameter indicate the extreme sizes to which Micanite can be formed.

Samples of Micanite in many varied shapes are freely offered for your inspection. A letter will receive our immediate attention.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St. Cleveland Pittsburgh Cincinnati San Francisco Seattle Birmingham Los Angeles Montreal and Toronto, Canada. Works: Schenectady, N. Y. London, England

PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF.

MICA INSULATION OILED CLOTH INSULATION

Adequate DeVilbiss Spray Equipment Means Speed and Economy In ALL Painting Operations

A bigger output of finished work is the objective of everybody engaged in painting operations today. For the next several weeks it will be a race between the man and the job.

The fact that a painter with a DeVilbiss Spray Gun may do the work three to five times as fast is one big reason for the universal acceptance and use of the spray method.

The quickest and best answer to your present urgent need for more production per day is DeVilbiss spray painting equipment. A complete DeVilbiss spray outfit, or if you already possess it, another spray gun—a small supplementary outfit—another paint tank—more hose—additional air compressing equipment,—these and other items suggest inexpensive ways to increase your capacity for work—to reduce your hour cost—to make the same quantity of material cover a larger area and in less time, so that you can move quickly on to the next job.

Check over your equipment. The new DeVilbiss catalog of railway spray painting equipment will reveal to you all the new, improved spray outfits and spray devices. Write for this catalog. Get properly organized to handle the summer rush in the right way.

EVERY painter and finisher should be familiar with the data and information in this new DeVilbiss catalog. A copy will be sent promptly on your request. Look to DeVilbiss for:

- Spray guns of various types and sizes.
- Pressure feed paint tanks and containers.
- Masking Paper and Liquid Spray Shield.
- Air compressing equipment.
- Air transformers and accessories.
- Air and fluid hose and connections.
- Spray booths, exhaust fans, and approved lighting fixtures.
- Complete outfits from the smallest hand-operated units to the largest industrial installations.

DeVilbiss
Spray-PAINTING FINISHING System

The DeVilbiss Company

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Sales and Service Branches
New York, Philadelphia, Cleveland
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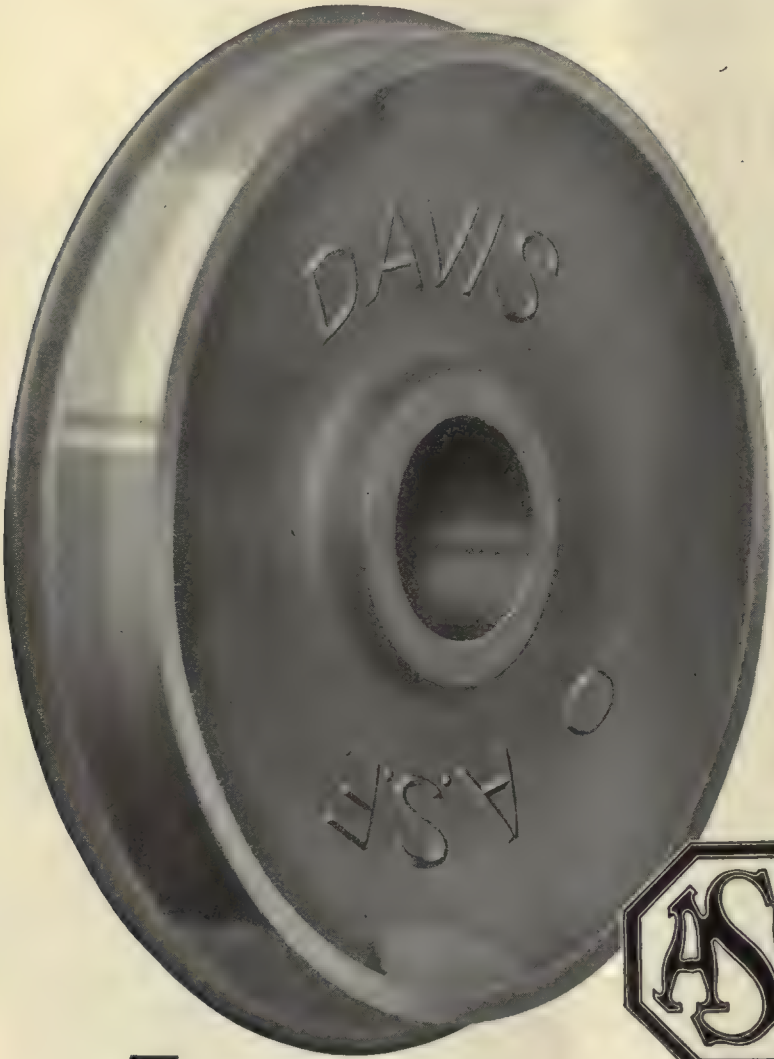
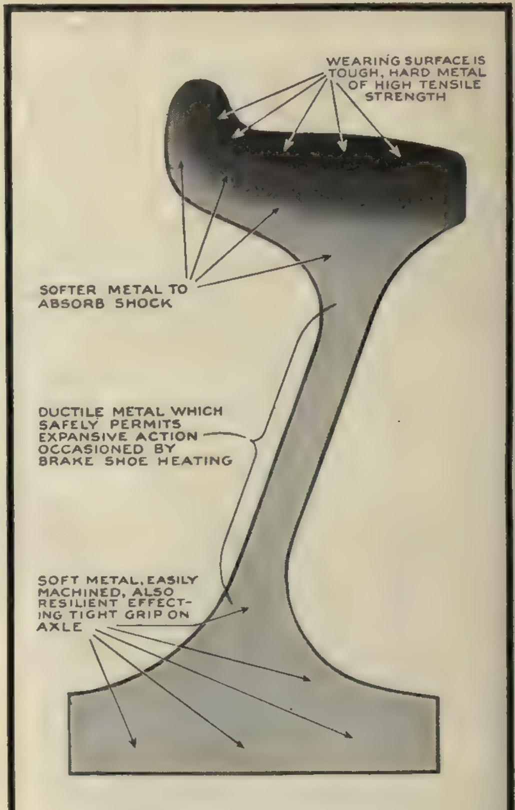
Meeting Conflicting Requirements




WEARING SURFACE IS TOUGH, HARD METAL OF HIGH TENSILE STRENGTH
SOFTER METAL TO ABSORB SHOCK
DUCTILE METAL WHICH SAFELY PERMITS EXPANSIVE ACTION OCCASIONED BY BRAKE SHOE HEATING
SOFT METAL, EASILY MACHINED, ALSO RESILIENT EFFECTING TIGHT GRIP ON AXLE

A proper distribution of required physical properties

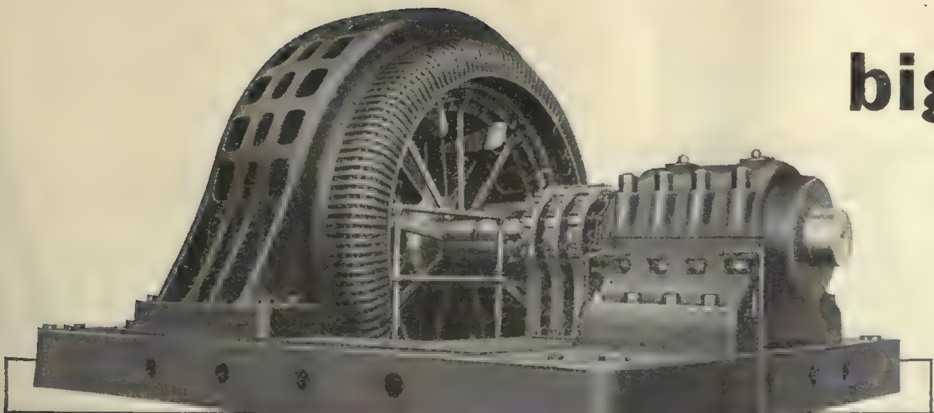
ASF

THE tread and the hub of a wheel won't agree as to what constitutes good material. One wants hardness and wear resistance, and the other wants ductility and shock resistance. To reconcile these opposing views and develop precisely the qualities needed in each part is the purpose of the special heat-treated composition of the Davis "One-Wear" Steel Wheel. Only such a special material can develop the unusual characteristics that make a steel wheel truly "One-Wear."

AMERICAN STEEL FOUNDRIES

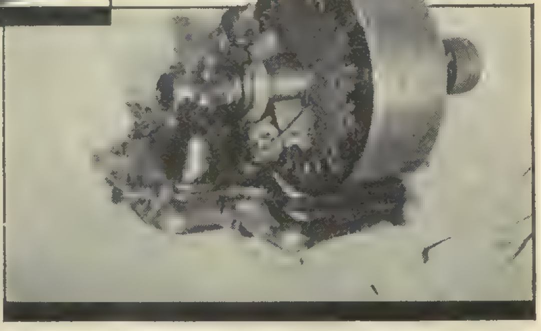
NEW YORK CHICAGO ST. LOUIS

big brother



6000-H. P., 2200-Volt slip-ring induction motor

½-H. P., 110-Volt, D. C. motor with external armature



AS THE family grows up, the youngest boy sometimes turns out to be the biggest and strongest. This was particularly true in the family of electric motors with whose history National Carbon Brushes are intimately associated.

The little motor illustrated above featured a unique external armature. The motor embodied the latest ideas of its day, including one of the earliest carbon brushes. Compare it with its big brother shown alongside. Progress! From ½ horsepower to 6000 IS progress.

Year by year barriers to the construction of large electrical driving-units were removed. Improvements in steel manufacture permitted high flux densities—improved insulation and knowledge of ventilation overcame temperature restrictions. A very important influence was the constant improvement of brushes—carbon, graphite and metal-graphite—thanks to the vast research-facilities of National Carbon Research Laboratories.

The 6000 H.P. motor shown above drives with ease a heavy steel-mill load which, a generation ago, was considered beyond the possibilities of electrical power. Rugged equipment such as this and the dependable quality of National Pyramid Brushes insure uninterrupted production in the great mills of industry.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division SILVER STRAND CABLE TRADE MARK REGISTERED Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

I

IN just four weeks the A.E.R.A. Convention meetings will be under way in San Francisco but the exhibits will be found only in the Convention and Exhibit Number of *Electric Railway Journal* that appears June 14th.

The editorial pages will tell of the trend and developments in equipment that are contributing, toward greater comfort, safety, speed . . . better appearance, operation and maintenance. The advertising pages will show what each manufacturer has to contribute toward these ends.

For the thousands who have to stay at home (unfortunately everybody

A. E. R. A. CONVENTION

San Francisco

JUNE 23-26

on't be long now!

an't go to San Francisco!) the onvention Exhibit and Convenion Report Numbers of *Electric ailway Journal* will represent the xhibits, meetings, new developnents, new business relationships, ll the interest and enthusiasm that o to make up these annual neetings.

he fact that there will be no Conention Exhibits this year places a irger responsibility on *Electric ailway Journal*, but we feel cerin of the whole-hearted support f manufacturers in our effort to lace before the whole industry as omplete a picture as possible of is year's Convention.

lore than a million dollars a day budgeted to be spent this year. dvertising should bring better reilts than ever before!

Some of the discussions planned for the Convention Number

Industry leaders are planning to discuss the following subjects in the Convention Number of *Electric Railway Journal:*

Developing Better Cars, Increasing Speed of Operation, Providing Greater Comfort, Reducing Vibration and Noise, Building Better Track, Making Cars More Attractive in Appearance, Improving Riding Qualities of Trucks, Promoting Safety, Progress in Trolley Bus Design, Modern Machinery for Improving Maintenance, Better Equipment for Freight Handling, Meeting the Power Demand, Facilitating Fare Collection, Improving the Bus to Increase Its Usefulness, Advancement in Structural Design of Vehicles, Increasing the Efficiency of Rapid Transit, Serving the Suburban Commuter.

All, you will admit, pertinent to the editorial theme, "Improving Design to Improve Transportation Service."

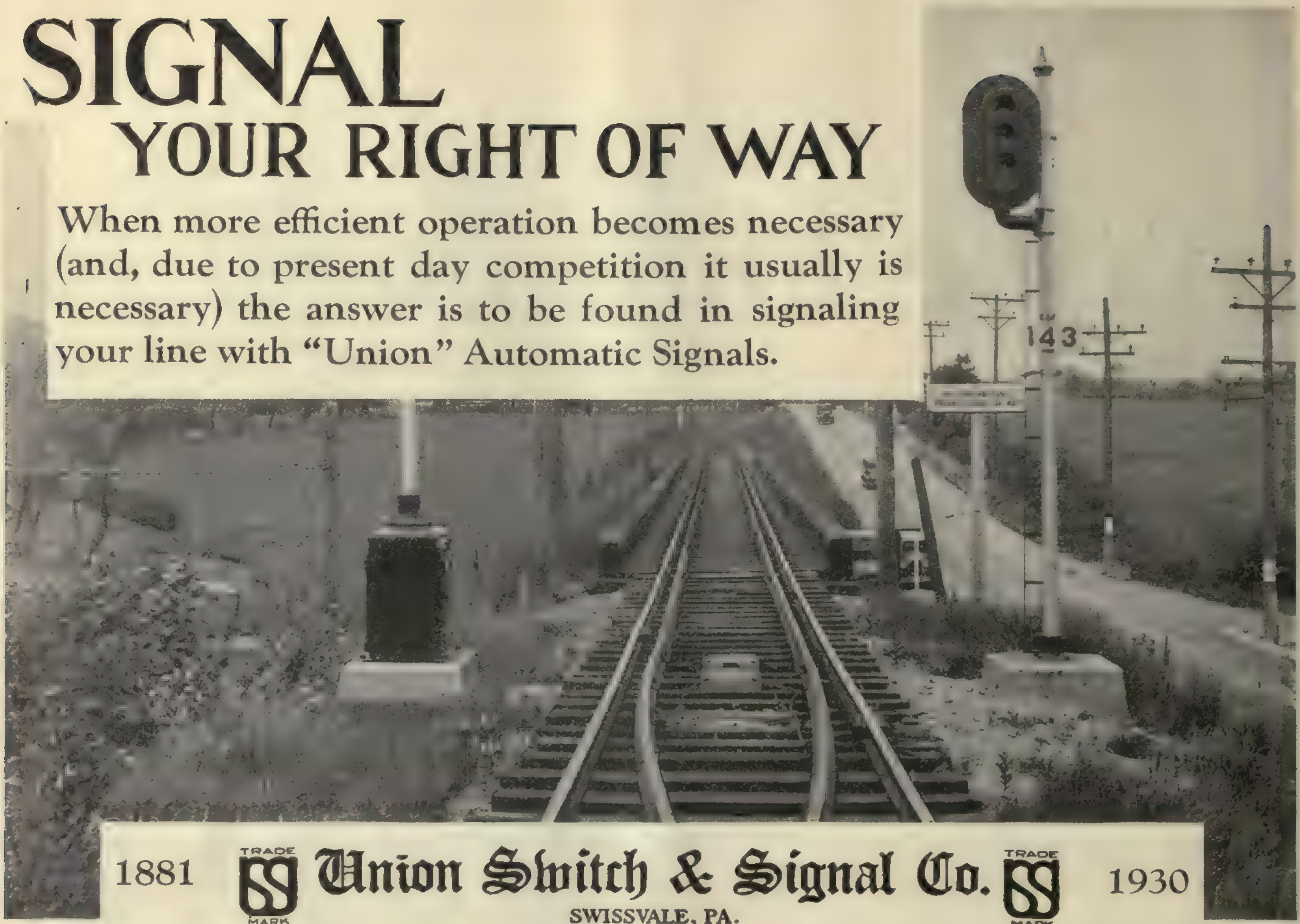
Electric Railway Journal

CONVENTION and EXHIBIT NUMBER

(FORMS CLOSE JUNE 4)

CONVENTION---REPORT NUMBER

(FORMS CLOSE JUNE 24)



SIGNAL
YOUR RIGHT OF WAY

When more efficient operation becomes necessary (and, due to present day competition it usually is necessary) the answer is to be found in signaling your line with "Union" Automatic Signals.

1881 TRADE MARK **Union Switch & Signal Co.** TRADE MARK 1930
SWISSVALE, PA.

They Jes' Keep Rollin'—

DAY in and day out, in rain, sleet, snow, ice, Kalamazoo Trolley Wheels keep rolling along. Durable, efficient they seldom need attention.

That is why leading Electric Railways use them and why we have supplied many of our customers for more than twenty-five years.

We will be glad to mail you our illustrated catalog upon request. *Write for it.*

THE STAR BRASS WORKS
KALAMAZOO, MICHIGAN

KALAMAZOO

2874
CAR DEALERS
DEMONSTRATE WITH SOCONY

Go to the car dealer for the TRUTH about gasoline—he knows!

WHAT SELLS a new car? The impression it makes when demonstrated. That's why more dealers in New York and New England demonstrate their cars with Socony Special *plus* Ethyl than with any other motor fuel.

You bus operators in New York and New England, take a tip from the car dealers. They have found that one of the many advantages of Socony Special *plus* Ethyl is that it does not knock. This is equally important to you. It means more power on hills, less gear shifting, and eliminates costly lay-ups for carbon removal and valve regrinding.

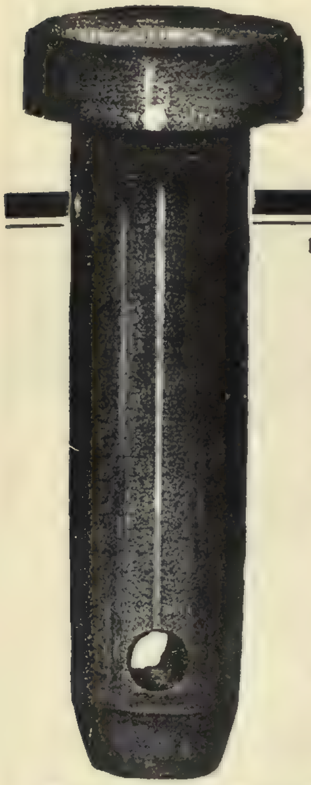
Try Socony Special *plus* Ethyl. Watch your cost per mile go down. Notice the saving on maintenance costs. Then we predict that you will do exactly what many other operators have done—use only Socony Special *plus* Ethyl. Remember, too, that Socony Aircraft Oil is the lubricant to use for *best* performance.

SOCONY

SPECIAL GASOLINE *plus* ETHYL
AIRCRAFT OIL

STANDARD OIL COMPANY OF NEW YORK

Here's the way to cut operating costs... "Boyerize"!



Labor, replacement of parts and loss of service of cars in the repair shop make operating costs mount up. Defective or ordinary car parts are often the causes of keeping these costs high. Such need not be the case. "Boyerize."

Boyerized Parts have three to four times the "wear-life" of ordinary parts—they cut replacement 50 to 75%. A special process makes them much more durable than parts of untreated steel.

Renew your stock with parts from the adjacent list.
Quotations gladly furnished. ***Write.***

BEMIS CAR TRUCK COMPANY
Electric Railway Supplies, SPRINGFIELD, MASS.

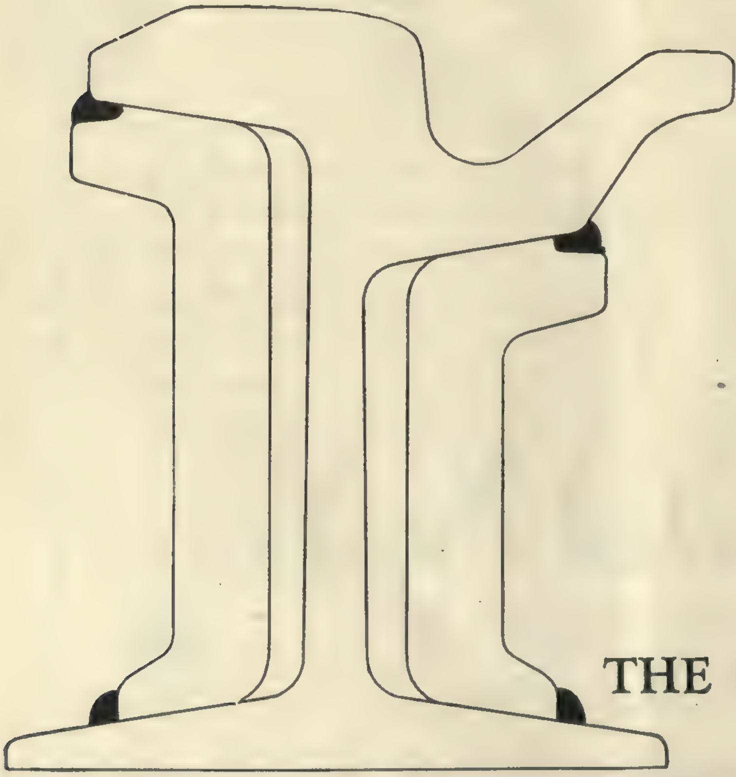
REPRESENTATIVES:
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 62-66 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

- **Brake Pins**
- **Brake Hangers**
- **Brake Levers**
- **Pedestal Gibs**
- **Brake Fulcrums**
- **Center Bearings**
- **Side Bearings**
- **Spring Post Bushings**
- **Brake Bushings**
- **Bronze Bearings**
- **Bolster and Transom Chafing Plates**
- **Spring Posts**
- **McArthur Turnbuckles**
- **Manganese Brake Heads**
- **Manganese Truck Parts**

"WELD PLATES"

For EFFICIENT, ECONOMICAL

JOINTS



Do you believe in statistics? Rely on performance records? If so, the performance records of the many "Weld Plates" now in use will convince you that they lead the bar-weld joints in efficiency and economy.

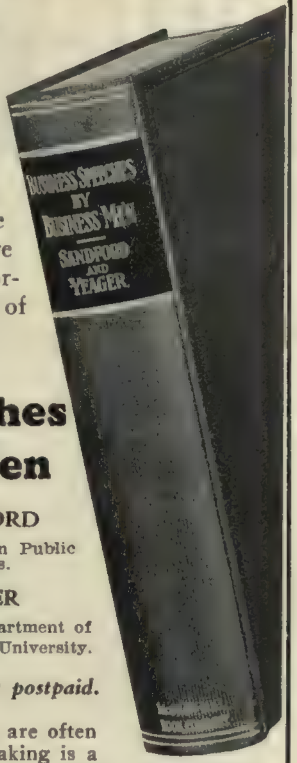
"Weld Plates" represent the most modern welding practice. They are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom—the suitability for the use of short bolts.

A trial will convince you of their efficiency and economy.

THE RAIL JOINT COMPANY
165 Broadway, New York

From the Firing Line of Business —*77 Picked Speeches*

Here is a book designed to help business men in the preparation of their addresses. Out of more than two thousand recent speeches by business and professional leaders, the authors have chosen seventy-seven which are now available as models of the correct application of the principles of business speaking.



Business Speeches by Business Men

by WILLIAM P. SANDFORD
Professor and Head of the Courses in Public Speaking, University of Illinois.

and W. HAYES YEAGER
Depew Professor and Head of the Department of Public Speaking, George Washington University.

447 pages, 5½ x 8, Price $5.00 postpaid.

This work shows just how men who are often before audiences—men to whom speaking is a necessary and frequently-used tool—win their way to their point, not by bombast, but by clear, definite planning, and by following tested principles in choosing their material, building their speeches and delivering them. The speeches chosen cover every important type of business speaking—goodwill speeches, courtesy speeches, promotional speeches, discussions of policy, reports, instruction, explanations, and inspirational talks—speeches before boards, associations, chambers of commerce, conventions; to employees, to the public, and over the radio.

You will find this book of interest, not alone as a collection of effective speeches, but also as a digest of authoritative opinion on many important business problems.

These national figures are typical of the business, industrial and political leaders who have delivered the speeches chosen for this collection:

HERBERT HOOVER
GEORGE B. CORTELYOU
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You may send me, for 10 days' free examination a copy of Sandford and Yeager's **Business Speeches By Business Men, $5.00** postpaid. I agree to remit for the book or return it postpaid within 10 days of receipt.

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PAVE TRACK AREAS WITH BRICK

MERIT alone has made brick pavements the standard pavement for track areas. Year after year it has demonstrated its unusual ability to resist weather and street traffic. Hence low upkeep.

In addition, brick pavements are especially adapted to withstand the stress from traction traffic yet allowing easy access at all times for track repairs.

For data on brick pavements, address National Paving Brick Manufacturers Association, 1245 National Press Building, Washington, D. C.

VITRIFIED
BRICK PAVEMENTS

DESIGNED for high-speed interurban service.

Steel frames, including cross and end transoms, cast in one strong unit.

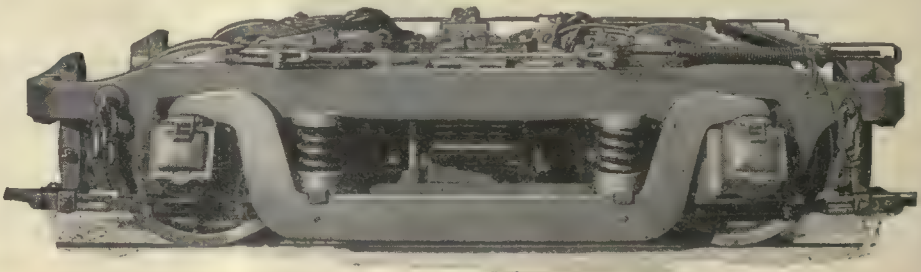
Pedestals cast integral with frame. Removable hardened spring-steel liners protect them from wear.

Commonwealth Trucks

LONG SERVICE WITH LOW OPERATING COSTS

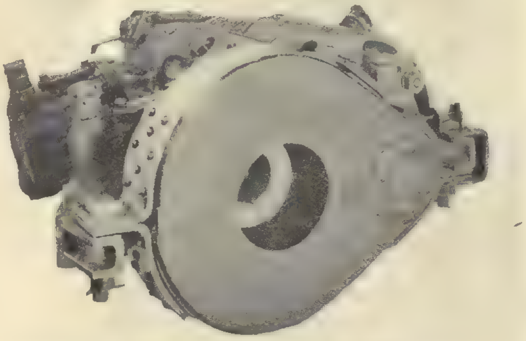
The excellence of their design, material, and workmanship makes these trucks the logical choice for modern street railway and high-speed interurban service. Their performance is daily demonstrating the value of Commonwealth engineering experience regardless of the operating conditions.

General Steel Castings Corporation
EDDYSTONE, PENNA. GRANITE CITY, ILLINOIS



(PATENTED)

Chillingworth
One-Piece Gear Cases



Seamless, Rivetless, Light in Weight

Chillingworth One-Piece Gear Cases will wear longer because they are made of tough durable deep drawing steel, properly annealed and supported by strong Malleable Iron Brackets, or Forged Steel if you prefer. They meet all operating requirements. Used extensively on rapid transit service.

Most steam road electrifications use Chillingworth Cases.

Chillingworth Manufacturing Co.
Jersey City, N. J.
REPRESENTATIVES

CANADA
Railway & Power Eng. Co.
ENGLAND
Tool Steel Gearing & Equip Co.

NEW YORK
J. W. Gerke
FRANCE
A. P. Champion

MERGOTT
CARFARE CARRIERS

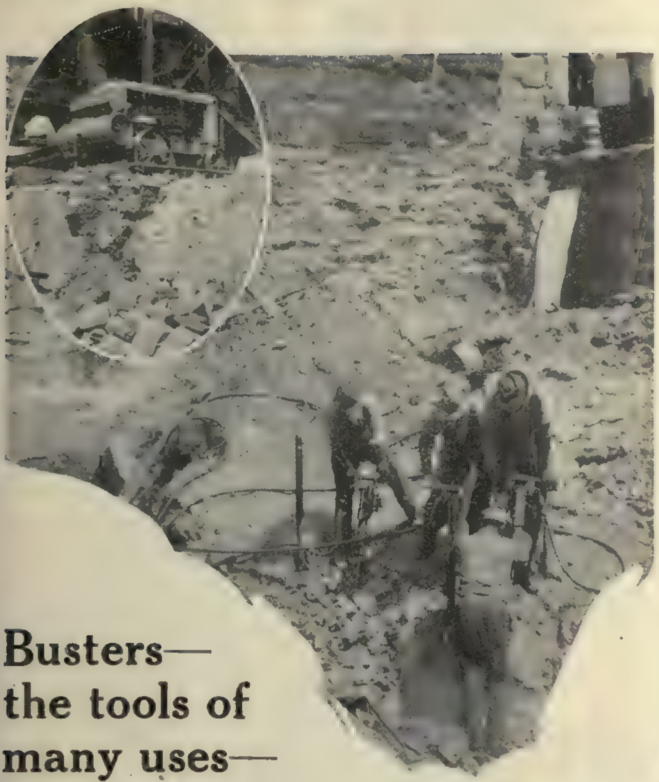
A Great Convenience to You as well as your patrons

The Mergott Carfare Carrier is an inducement to riders to buy a large quantity of tokens at one time, reducing delays, confusion, change making, and mistakes.

Traction companies in 26 states and provinces have distributed this sturdy, compact fare container to patrons and find it builds goodwill. Space on reverse side for your advertising.

Write now for samples, quotations and full particulars.

J. E. MERGOTT CO.
MANUFACTURERS
318 to 368 Jelliff Ave., Newark, N. J.



**Busters—
the tools of
many uses—**

Remove Old Foundations

W. F. Trimble and Sons picked six Sullivan Busters to remove old foundations at low cost.

The contract covered excavation for the new Bell Telephone Building in Pittsburgh.

Old concrete had to be broken up for the shovel. Blasting was "out" on account of windows.

Sullivan Busters promised a wise investment for several reasons.

First, these tools have a reputation for being rugged, fast-working concrete breakers. And they are easily handled, and have low repair cost.

But, in addition, the Busters can be used later, on almost any other kind of work.

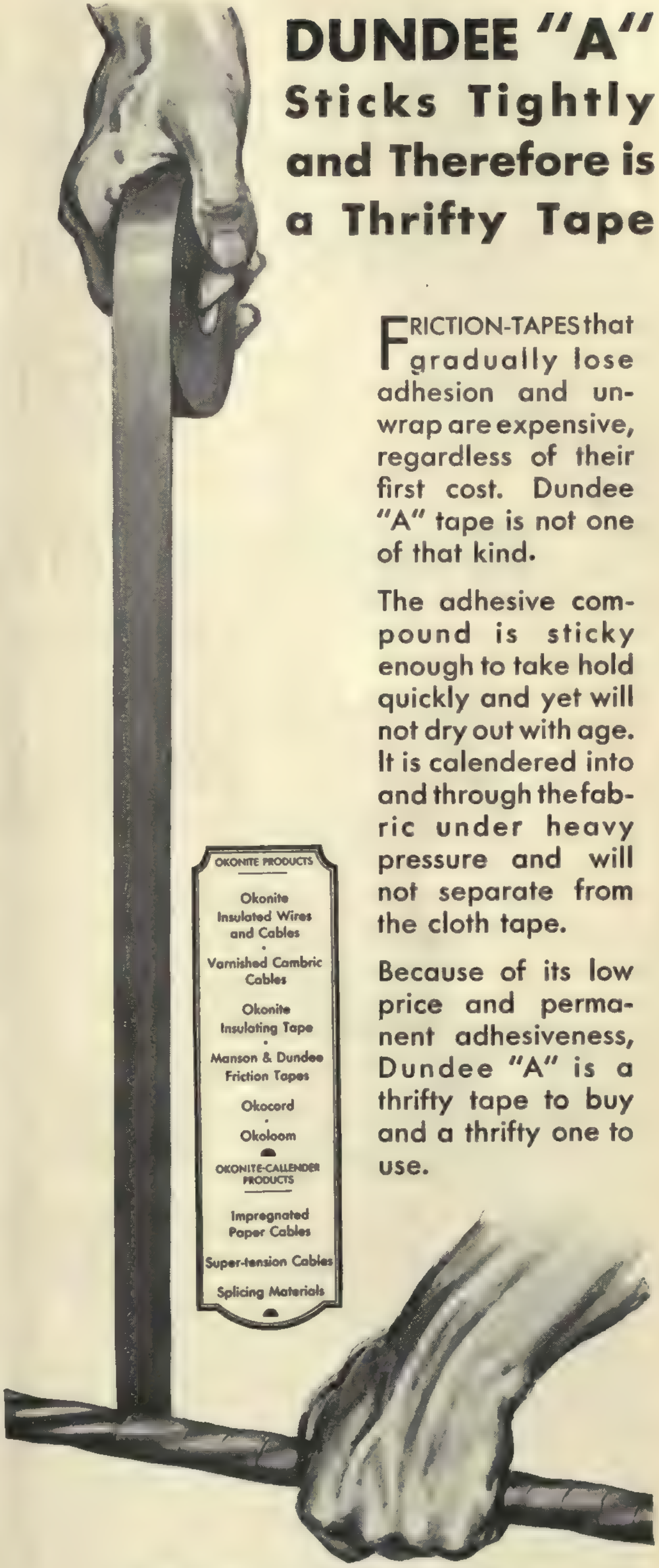
For they remove concrete or asphalt pavement —demolish old buildings—dig hard pan, shale, or frozen ground—tamp backfill—drill shallow ledge—or drive sheet piling.

***Why not send for the new
Buster Picture Book?***

SULLIVAN
Air Power Equipment
Sullivan Machinery Company
809 Wrigley Bldg., Chicago

Offices in all principal cities of the world

**DUNDEE "A"
Sticks Tightly
and Therefore is
a Thrifty Tape**



FRICTION-TAPES that gradually lose adhesion and unwrap are expensive, regardless of their first cost. Dundee "A" tape is not one of that kind.

The adhesive compound is sticky enough to take hold quickly and yet will not dry out with age. It is calendered into and through the fabric under heavy pressure and will not separate from the cloth tape.

Because of its low price and permanent adhesiveness, Dundee "A" is a thrifty tape to buy and a thrifty one to use.

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Founded 1878
THE OKONITE-CALLENDER CABLE COMPANY, INC.
Factories: Passaic, N. J. Paterson, N. J.
SALES OFFICES:
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BOSTON ATLANTA BIRMINGHAM SAN FRANCISCO
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Novelty Electric Co. Philadelphia, Pa.
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Canadian Representatives: Engineering Materials, Limited, Montreal
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STRUCTURAL
STEEL

For all
kinds of
BRIDGES
and
BUILDINGS

AMERICAN BRIDGE COMPANY
Subsidiary of United States Steel Corporation

Manufacturers of
STEEL STRUCTURES
for every purpose

General Office: 71 BROADWAY, NEW YORK, N. Y.
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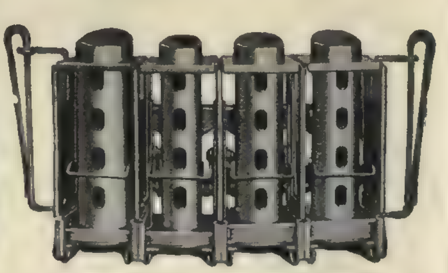
JOHNSON
FARE
COLLECTING
SYSTEMS

Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1⅓ to 5% and the efficiency of one-man operation is materially increased. Quicker boarding of passengers with resultant reduction in running time for the buses. Over 5,000 already in use.

When more than three coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tokens.



Johnson Fare Box Co.
4619 Ravenswood Ave., Chicago, Ill.

RACOR
TRADE MARK

AUTOMATIC
FEATURES THAT
SPARE THE
SWITCH POINTS

THE new Racor Style No. 100-A Three-in-one Switch Stand has many safety features. It includes a rigid switch stand for free hand operation independent of the automatic, retarded, spring return feature. It is used to retard the return of switch points to normal position where switches are arranged for normally trailing through, as at passing sidings. Every track foreman and superintendent should send for full information now.

Behind Racor Service stand nine plants specializing in the manufacture and distribution of railroad track turnout and crossing equipment, including Manganese Work for heavy traffic.

RAMAPO AJAX CORPORATION
RACOR PACIFIC FROG AND SWITCH COMPANY, Los Angeles • Seattle
CANADIAN RAMAPO IRON WORKS, LIMITED, Niagara Falls, Ontario

General Offices – 230 PARK AVENUE, NEW YORK
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McCORMICK BUILDING, CHICAGO
METROPOLITAN BANK BLDG, WASHINGTON
BUILDERS EXCHANGE BLDG, ST PAUL

Nine Racor Works
Hillburn, New York. Niagara Falls, N.Y. Chicago, Illinois. East St. Louis, Ill.
Superior, Wis. Pueblo, Col. Los Angeles, Cal. Seattle, Wash. Niagara Falls, Ont.

TRACK maintenance drops a heavy burden

*Patented July 6, 1926

TW

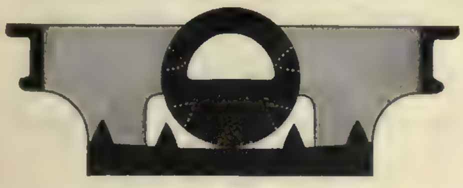
The NEW Scientifically designed . . . WHARTON CROSSING

NO LONGER is track maintenance on the fifty leading roads that have installed the new Wharton crossing heavily burdened with excessive crossing costs » » » For these roads are no longer dependent on crossings not scientifically designed and engineered to meet the severest tests of service » » » The new Wharton crossing is the first and only crossing scientifically designed and built to withstand the ceaseless pounding of locomotives, cars and loadings. It will give far longer service, and appreciably lower crossing maintenance under any operating condition » » » Learn more about the design of the new Wharton crossing and the service it is giving on leading roads. Ask for bulletin 1 C.

William Wharton Jr. & Co., Inc.
EASTON, PENNSYLVANIA
SALES OFFICES: Pittsburgh Chicago Houston Montreal New York
Philadelphia Boston San Francisco Scranton Los Angeles

STUCKI SIDE BEARINGS

SPECIAL CARBON STEEL
HEAT TREATED



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FREE ROLLER
ONLY TWO PARTS

A. STUCKI CO.
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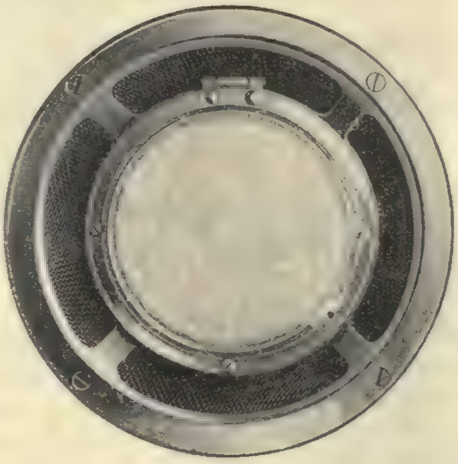
Canadian Representative:
The Holden Co., Ltd., Montreal, Canada

Roebling
Electrical
Wires & Cables

Quality Products

From the finest Magnet Wire
to Largest Power Cables.

John A. Roebling's Sons Company, Trenton, N. J., Makers of Wire Rope and Wire



The No. 145 Ventilator Grill

A new unit giving maximum ventilating and lighting efficiency, yet can be used directly above the aisle without sacrificing head room.

The Nichols-Lintern Co.
7960 Lorain Ave., Cleveland, Ohio

R 11 Double Register

A Fare Registration System that Gains the Confidence of ALL

The durability, accuracy, speed and convenience of International Registers has given them the nation-wide reputation for efficient service that they have enjoyed for over thirty years.

Electric operation gives the new types even greater speed, accuracy and convenience. Registers can be furnished for operation by hand.

The International Register Co.
15 South Throop St., Chicago

News * * * *

brief, late news flashes for the *electric railway industry*

!

To supplement the service of the regular monthly issues of *Electric Railway Journal*, a separate NEWS service appears on thirty-nine Saturdays during the year. This supplement keeps you in touch with court decisions . . . fare increases . . . new ordinances . . . association meetings . . . financial announcements . . . equipment purchases.

Subscription Price: For all countries taking domestic subscription rate, $2 per year. Combination with the monthly edition of *Electric Railway Journal* for $4 a year domestic rate.

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NEW YORK CITY

Enter my subscription to the Electric Railway Journal *News*. Bill me for $2.

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Address.....................................

City.......................... State..............

PANTASOTE

TRADE MARK

—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

Standard for electric railway cars and motor buses

Samples and full information gladly furnished.

The PANTASOTE COMPANY, Inc.
250 Park Avenue NEW YORK

Don't Sell Half-a-Ride!

Today, comfort and cleanliness are a large part of any ride. Look to your seat covering for half your passenger's impression will come from this source.

General Leathers are made to help you sell attractive transportation. Clean—with fast colors, they can be quickly washed up with soap and water. Made from the best hides and tanned to give long wear General Leathers are economical, too.

Specify General Leathers for seat upholstery on your new Cars and Taxi-cabs, or send to us directly for replacements.

Samples on request.
America's Largest Produce

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London Office:
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21 West Smithfield,
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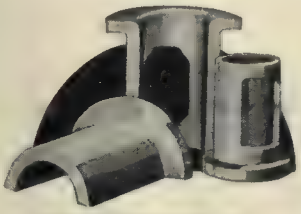
LONG TIME ECONOMY with NATIONAL PRODUCTS

Quality materials, sound engineering, long experience, and extensive facilities all are a part of National production. The net result is economy of operation. This economy is not only an initial realization but extends over a long period of time.

You can safely standardize on "National" Products. In recommending them, we are thinking of your efforts along lines of economical operation and the value "National" Products can be to you in your modernization program.

Our Engineering Department will be glad to cooperate so that you may obtain the proper products for your particular needs.

"Armature" Babbitt Metal



"Tiger" Bronze Axle and Armature Bearings

"More-Jones" Trolley Wheels and Harps

NATIONAL BEARING METALS CORP.
St. Louis, Mo.

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Meadville, Pa.
Jersey City, N. J.
Portsmouth, Va.
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Transportation Examinations and Reports

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Traffic — Traction
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Current issue LATE NEWS and FACTS free on request

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TRAFFIC SURVEYS
VALUATIONS

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells
Albert W. Hemphill

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Reorganization Management
Operation Construction

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231 S. La Salle Street, Chicago
New York Pittsburgh San Francisco

SANDERSON & PORTER

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for the
FINANCING—REORGANIZATION
—DESIGN—CONSTRUCTION
of
INDUSTRIALS and
PUBLIC UTILITIES

Chicago New York San Francisco

The P. Edward Wish Service

50 Church St., NEW YORK

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DETECTIVES

131 State St., BOSTON

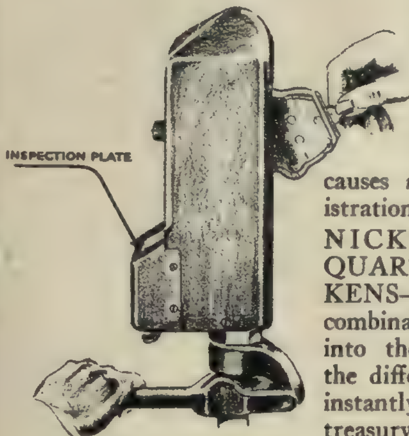
WALTER JACKSON

Consultant on Fares
and Motor Buses

The Weekly and Sunday Pass
Differential Fares—Ride Selling

Holbrook Hall 5-W-3
472 Gramatan Ave., Mt. Vernon, N. Y.

Fare Collection,

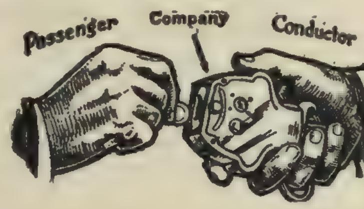


to avoid the old temptations and leaks, *necessitates the coin-slot mechanism.*

Coin - insertion causes *instantaneous* registration *by the patrons.* NICKELS, DIMES, QUARTERS or TOKENS—all or in various combinations, are paid into the *one* coin-slot—the different values being instantly assured your treasury.

MONEY METERS are furnished in either *portable* or *stationary* form and are mechanically unbeatable for trolleys and buses.

This *at-the-source* protection will probably add 4% to 10% to your present passenger income.

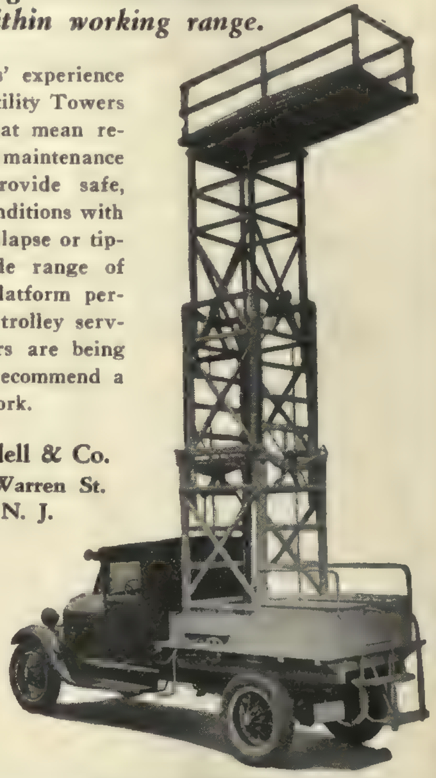


Money-Meters, Inc. (Successor to Rooke Automatic Register Co.)
3209 Book Tower, Detroit, Mich.

TRENTON TOWERS

Safest—fastest—most practical for bringing overhead construction within working range.

Forty-four years' experience give Trenton Utility Towers new features that mean reduced labor and maintenance costs. They provide safe, easy working conditions with no danger of collapse or tipping. The wide range of the revolving platform permits continuous trolley service while repairs are being made. Let us recommend a type for your work.

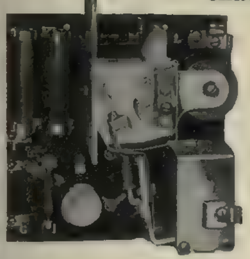


J. R. McCardell & Co.
391-401 So. Warren St.
Trenton, N. J.

Utility Car Heaters fitted with

ENCLOSED HEATING elements carry the Underwriters' Laboratories Label. They give 100% energy output for what you put in.

CHROMALOX STRIP



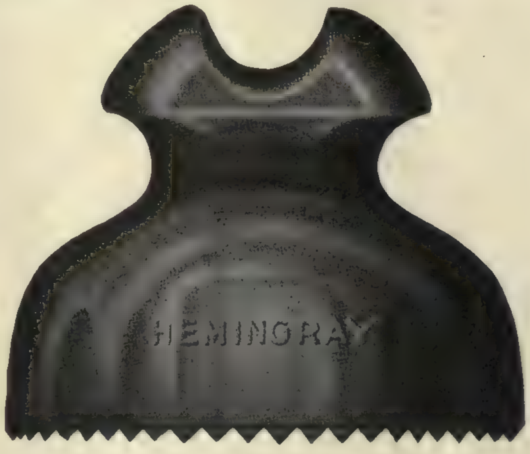
NO. 10 REGULATOR

UTILITY HEAT REGULATORS economize in current consumption.

UTILITY HONEYCOMB VENTILATORS keep the air pure and wholesome.

Car Comfort with Utility Heaters Regulators Ventilators

RAILWAY UTILITY COMPANY
2241-47 Indiana Ave., Chicago
J. H. DENTON, *Eastern Mgr.*
1328 Broadway, New York



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870

Make your used equipment help cut the cost of replacements!

Used Railway Equipment—cars, rails, poles, appliances, road building material, etc.—that you consider of no further value in your service, may just fit the need and purpose of some other organization in the field of electric railway operation.

There's always a market for used railway equipment somewhere. Don't make the mistake of junking good equipment, when there's a possibility of turning it into cash to be applied against the cost of replacements. Send us a list of the equipment you wish to sell and we will quote you the cost of advertising it here. Over 6,000 executives and officials in the electric railway field watch the Searchlight Section for opportunities to purchase used equipment.

Advertise it in the—
SEARCHLIGHT SECTION

SEARCHLIGHT SECTION

EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

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Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 inch	$6.00
2 to 3 inches	5.75 an inch
4 to 7 inches	5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

FOR SALE

Motor Generator Set

Direct connected. Synchronous motor; 150 hp., 400 v., 3 ph., 25 cy. This motor must be rewound. New coils in stock. Generator, 100 kw., 600 v., 750 r.p.m. In good condition.

Washington & Old Dominion Railway
31st and M Sts., N. W., Washington, D. C.

New "SEARCHLIGHT" Advertisements

must be received by 5 P.M. the 20th of the month to appear in the issue out the following month.

Address copy to the Searchlight Department

Electric Railway Journal
Tenth Ave. at 36th St., New York City

WANTED

Railway-Equipment Power Plants Rails and Overhead

Be sure to get our bid.
Dismantling done by us.

The Allite Corporation
636-38 Broadway, New York

FOR SALE

Passenger Cars—Freight Motors

12—All Steel Cars
1—All Steel Freight Motor
2—Semi-Steel Freight Motors

All have Baldwin Trucks, H. L. Control
W. 333 Motors, Straight and Automatic Air

All in First Class Condition.

Cars recently painted and equipped for train operation. Seating capacity 59.

Attractive Prices for Quick Sale

THE JOSEPH SCHONTHAL COMPANY
COLUMBUS, OHIO

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire railroads and street railways. Also industrial and public service properties which have ceased operation. We furnish expert appraisals on all such properties.

May We Serve You?

The Perry, Buxton, Doane Company
(Capital $1,000,000.00)

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.
Pacific Sales Office—Failing Building, Portland, Oregon

POSITIONS WANTED

MASTER mechanic, with broad experience in the electric railway field, desires change; successful record long on the job. Excellent references. Will go anywhere. PW-212, Electric Railway Journal, Tenth Ave. at 36th St., New York.

RAILWAY man, 20 years' experience, familiar with all phases of electric railway and bus operation; successful record in dealing with labor, reducing operating costs. Excellent references. PW-214, Electric Railway Journal, Tenth Ave. at 36th St., New York.

WANTED—Position as working foreman; 12 years' experience all kinds of repairs and wiring. Can wind armatures. Not afraid of work. PW-213, Electric Railway Journal, Tenth Ave. at 36th St., New York.

AGENTS WANTED

Agents Wanted

For a portable high efficiency electric welder for street railway circuits. Portability such that one man can easily handle the machine on the street. Machine is provided with pneumatic tires and springs so that it can be towed for long distances at high speed. Current consumption from five hundred volt trolley is twelve amperes for two hundred amperes in the arc circuit. Normal welding capacity two hundred amperes; maximum capacity three hundred amperes. Write to the Economy Electric Products Co., 2400 Woodland Ave. Cleveland, O.

FOR SALE

Birney Cars

6—Birney Cars, Cincinnati, Type H trucks, G.E. 258C Motors G.E. K69 controllers, Westg. DH compressors. These cars are still in operation but will be released on or about June 1, 1930.

5—Birney Cars same as above which have been idle approximately two years. Cars can be inspected at any time at Oshkosh, Wisconsin. If interested, write or wire

Wisconsin Power and Light Company
122 West Washington Ave., Madison, Wisc.

FOR SALE
1000 K.W.
SYNCH. MOTOR GEN. SET

Modern type Westinghouse 575 v. D.C., 3 ph., 60 cy., 2,200 v., .8 P.F., A.C. 900 r.p.m. Motor Generator Set with Dir. Conn. Exciter and complete A.C. and D.C. Switchboards. Condition 95% New.

JOHN D. CRAWBUCK COMPANY
Empire Bldg., Pittsburgh, Pa.

HIGHEST PRICES PAID FOR ELECTRIC RAILWAYS FOR—

DISMANTLING

M. K. FRANK
Clark Building,
Pittsburgh, Pa.
220 E. 42d Street,
New York,
N. Y.

Paint-stripping costs cut 50%

COST of materials and labor for stripping paint from cars in the shop of a certain Southern traction company were considered too high. Then Oakite materials and methods were given a trial.

Immediately a change was noted. One particular car, on which there were thirty coats of paint, was stripped to the original wood and metal at a cost of less than $10 . . . a saving of 50%. This tremendous amount of paint was removed without any hand scrubbing or scraping . . . a final rinse left surfaces ready for repainting.

Similar economies are being effected in hundreds of car shops throughout the country wherever Oakite materials and methods are in use for cleaning and related operations. Write for particulars. Or ask our nearest Service Man to call. No obligation in either case.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames Street, NEW YORK, N. Y.

OAKITE
TRADE MARK REG U S PAT OFF
Industrial Cleaning Materials and Methods

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Today is the day of Fast Schedules

Nachod CD Signal on Interurban lines of Georgia Power Co.

Speed is made safe with Nachod CD Block Signals. They enable your cars to get over your line to bring in the revenue, and they obviate delays at switches so vexatious to passengers.

Nachod CD Signals get the most out of your single track by permitting cars to follow through the block. Progressive railways all over the country are modernizing by installing these time-saving devices.

NACHOD
SPELLS SAFETY

Besides these and other *single* track signals the Nachod & United States Signal Co. Inc., manufactures high-speed, double-track, three-indication, color-light signals for rear protection, annunciator signals showing arrival of car, highway crossing signals with flashing light indications, headway recorders that time your cars as they pass, trolley contactors, high voltage relays.

Nachod and United States
Signal Co., Inc.
4777 Louisville Ave.
Louisville. Ky.

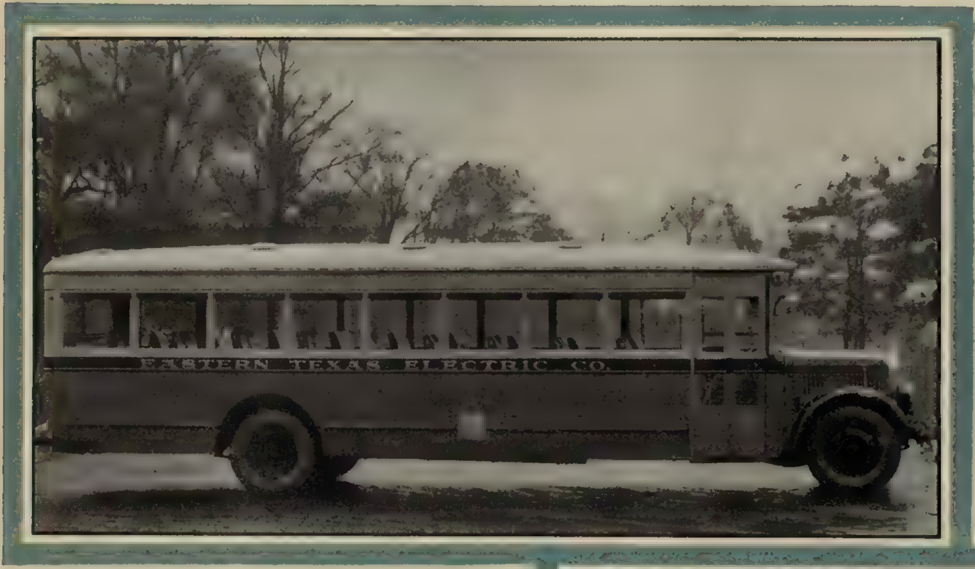
We Also Manufacture

Turn-right Signals, Signals for Single and Double Track, Stub End Signals, Annunciator Signals, Headway Recorders

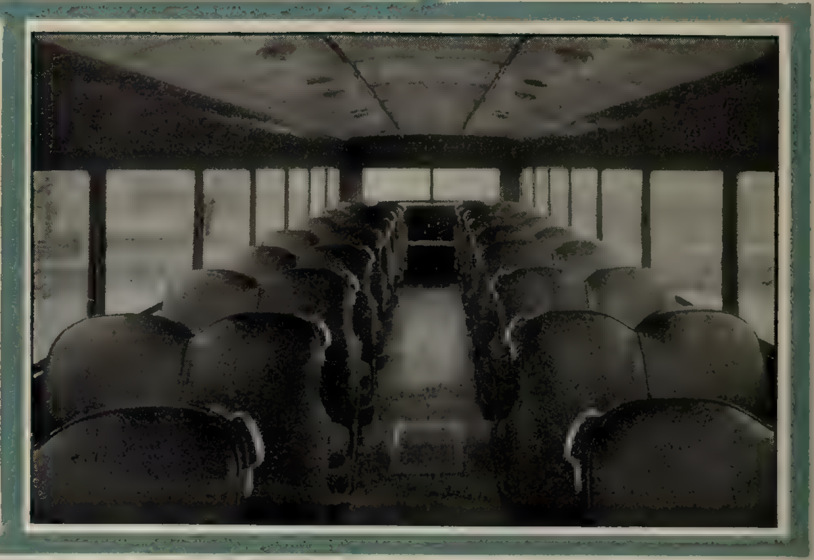
41 Seats and Lots of Standing Room in this BENDER Pay-Enter—

the answer to many operators' peak load problems

Note the 41 seats and generous aisle which can be further amplified by longitudinal seats to increase standing room.


EASTERN TEXAS ELECTRIC CO.

This same body fitted with 37 arm chair seats and auxiliary overhead inside luggage racks has proven very popular for short interurban runs where greater comfort and luggage facilities are desired. . . . .



Operators are more and more relying upon Bender standard construction methods and standard body units to answer their problems from the standpoint of service and comfort to their riders, combined with low and easy maintenance. . . . . . .

BENDER BODIES

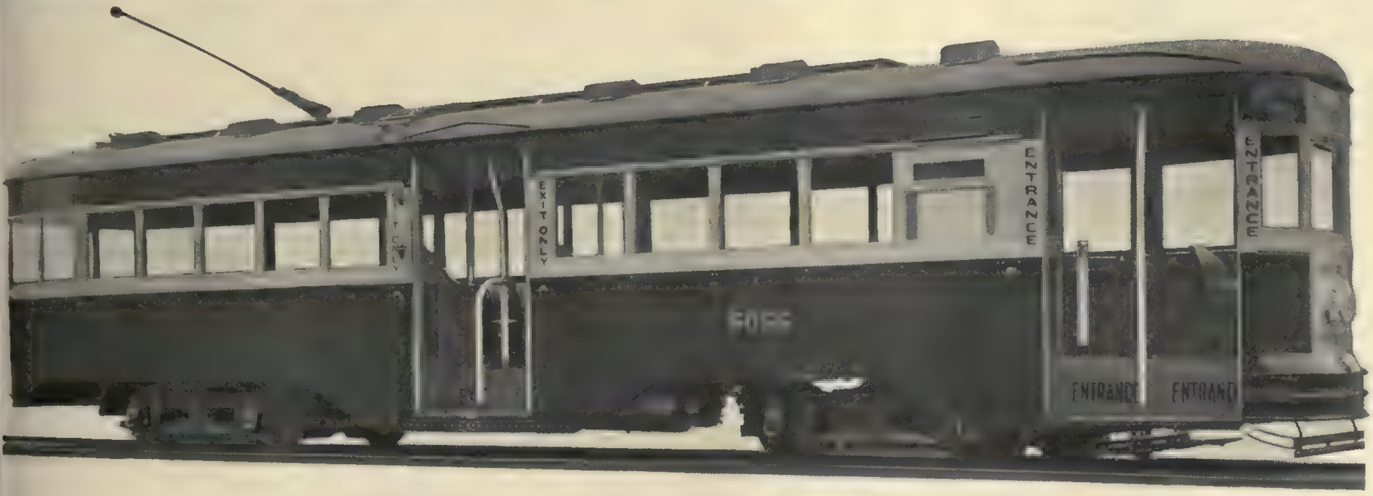
THE BENDER BODY COMPANY ✣ West 62nd and Denison ✣ Cleveland, Ohio

The New Brooklyn Cars ~

The Brooklyn & Queens Transit Corporation have received the 50 new street cars built by Brill. Citizens of Brooklyn, therefore, are now riding in Brill Modern Cars. They are of the single-end front-entrance center-exit type, 45 ft. 6 in. long over bumpers, seat 54 passengers, and are mounted on Brill No. 177-E-1 Trucks equipped with 35 H.P. motors and 26 in. wheels.

Brill 177-E-1 Trucks were specified for the 100 cars purchased, another indication of the high esteem in which this and other types of Brill Trucks are held. This reputation is due to the smooth and comfortable riding action, comparatively low maintenance, and general efficiency of this equipment.

Brill { 50 Cars ~ 200 Trucks



Quick loading and unloading a feature of the new Brooklyn Cars.

THE J. G. BRILL COMPANY
PHILADELPHIA

American Car Company
St. Louis
The G. C. Kuhlman Car Co.
Cleveland

BRILL

Wason Manufacturing Company
Springfield, Mass.
Pacific Coast Representative
Rialto Bldg., San Francisco

"99.92 PER CENT ON TIME"

THE COUNTY TRANSPORTATION COMPANY'S RECORD WITH MACKS

County Transportation Company, Inc., is a part of the New York, Westchester & Boston Railway System. It operates 62 buses, all Macks. Statistics compiled recently at the offices of the company show the following significant record: "Motor coaches were operated 99.92 per cent on time during the month of November, 1929; 19,580 trips being made with an average delay of only 40 seconds per thousand passengers, or .040 per passenger." It is believed that this establishes a record for the lowest time delay per passenger. This high standard of service is consistently maintained throughout the year.

THE highly trained bus personnel of the County Transportation Co., Inc., in Westchester County, New York, are to be congratulated for their admirable time record on the crowded thoroughfares of New York City's most congested suburban territory. It adds another brilliant chapter to the long story of Mack Bus Performance.

The ability of Mack buses to maintain service is reflected in the testimony of all large Mack operators. It is the result of the greater margin of power and speed which is inherent in the efficient Mack power plant. It proves the flexibility with which Mack buses can be handled in congested traffic situations.

25 Broadway Mack **New York, N. Y.**

Trucks, Inc.

ANNUAL CONVENTION AND EXHIBIT NUMBER

ELECTRIC RAILWAY JOURNAL

aw-Hill Publishing Company, Inc. JUNE 14, 1930 Fifty Cents per Copy

Progressive Operators Specify Westinghouse Equipment for New Cars

Following is a partial list of recent orders:

Railway	Service	No. Cars	Total Hp.	No. and Type Motors	Control	Carbuilder
Board of Transportation of the City of New York	Subway	300	380	2-570	ABF	American Car and Foundry Company
Chicago North Shore and Milwaukee R.R. Co.	Interurban	25	560	4-557	HLF	Pullman Company
Cincinnati and Lake Erie R. R.	Interurban	10	400	4-539	HLF	Cincinnati Car Corporation.
Northern Indiana Railway Inc.	Interurban	10	200	4-516	K-75	Cummings Car & Coach Company
Northwestern Pacific R.R.	Interurban	12	560	4-557	ALF	St. Louis Car Company
Allegheny Valley Street Railway Co.	Interurban	10	140	4-1425	K-75	Cincinnati Car Company
Brooklyn & Queens Transit Corp.	City	50	140	4-510	VA	Osgood Bradley Car Company
Brooklyn & Queens Transit Corp.	City	50	140	4-510	VA	The J.G. Brill Company
Cleveland Railway Company	City	100	200	4-340	HL	The G. C. Kuhlman Car Company
Montreal Tramways Co.	City	50	140	4-510	VA	Canadian Car & Foundry Company
United Rwys. & Elec. Co. of Baltimore	City	50	200	4-516	VA	The J. G. Brill Co.
Lynchburg Traction & Light Co.	City	20	140	4-510	K-75	The J. G. Brill Co.
Youngstown Municipal Rwy. Co.	City	13	140	4-1425	PCM	The G. C. Kuhlman Car Company
Union Street Rwy. Co. New Bedford, Mass.	City	12	140	4-510	HL	Osgood Bradley Car Company
Lorain Street Rwy.	City	10	140	4-510	K-35	St. Louis Car Co.
Northern Indiana Rwy. Inc.	City	10	140	4-510	K-35	Cincinnati Car Corporation
Chicago Surface Lines	City	36*	100	2-1426	VA	Twin Coach Corp.
City of Detroit, Dept. of Street Rwy.	City	6*	100	2-1426	VA	Twin Coach Corp.

*Trolley buses.

Ask the nearest Westinghouse office for recommendations on modern transportation apparatus.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

WESTINGHOUSE ELECTRIC

T 31367

Electric Railway Journal

Morris Buck
Engineering Editor
George J. MacMurray
Clifford A. Faust
J. W. McCloy
Joseph R. Stauffer

Consolidation of
Street Railway Journal and Electric Railway Review

John A. Miller, Jr., *Managing Editor*
Vol. 74, No. 7 *Pages 355-426*

Paul Wooton
Washington
Alex McCallum
London, England
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Publishing Director

In the

July Number

will appear the
full report of the

A.E.R.A.
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CONVENTION

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Tenth Avenue at 36th Street
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1930

Official correspondent in the United States for Union International de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles.

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Washington, *National Press Building*
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Philadelphia, *1600 Arch Street*
Cleveland, *Guardian Building*
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San Francisco, *883 Mission Street*
Los Angeles, *632 Chamber of Commerce Bldg.*
London, *6 Bouverie Street, London, E. C. 4*

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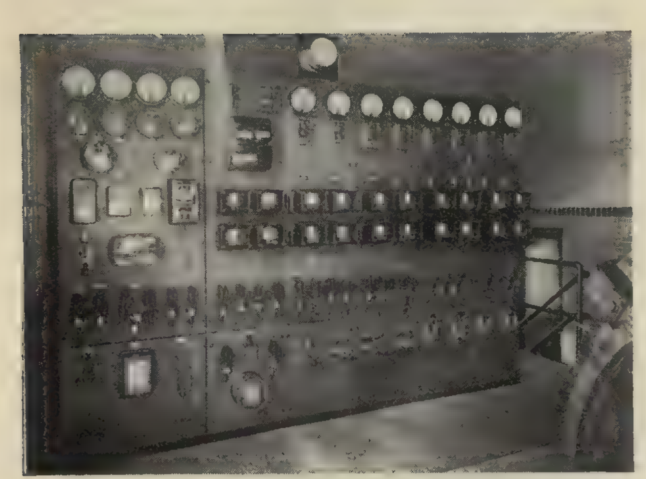
Actual PERFORMANCE *...the proof of reliability*



Automatic switching equipment for a 2000-kw. synchronous converter.

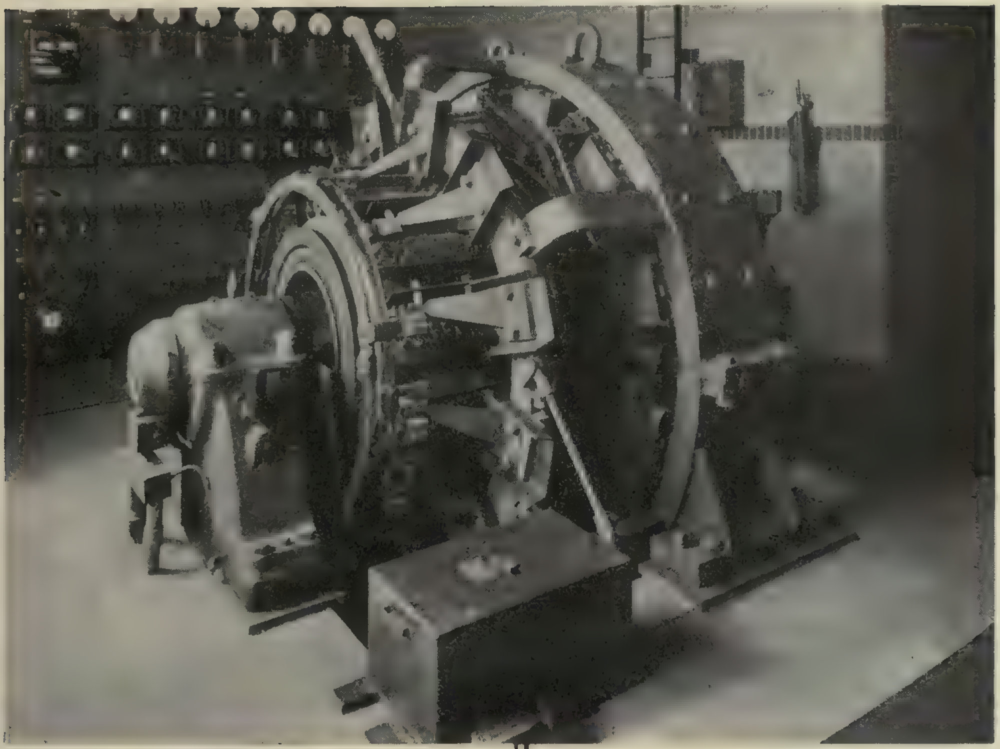
ACTUAL operating data on several large railway systems has shown the reliability of the Westinghouse automatic synchronous converter substations to be practically perfect. In many instances this type of automatic substation has operated for months without a single interruption.

Such reliability is the result of long experience with railway problems, and the development of power conversion equipment particularly adapted to this class of service.

High reluctance commutating poles, a system of flash barriers on the converter, and the simplified automatic switching equipment with the Rectox polarity-insuring device, are a few of the many features that provide this high degree of reliability.

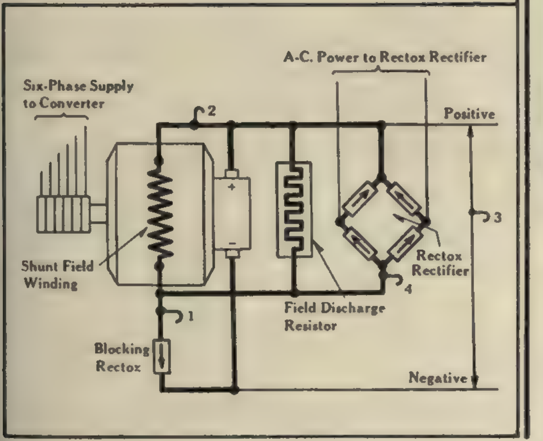
Included also, is the well-known type CH interrupter—a circuit breaker that has proved its reliability under the most severe operating conditions.

Specify Westinghouse automatic synchronous converter substations to assure the reliability of your next power conversion installation.



A 2000-kw., 600-volt d-c., 60-cycle, shunt-wound synchronous converter.

Typical installation of the pedestal-mounted interrupters and load-shifting resistance.

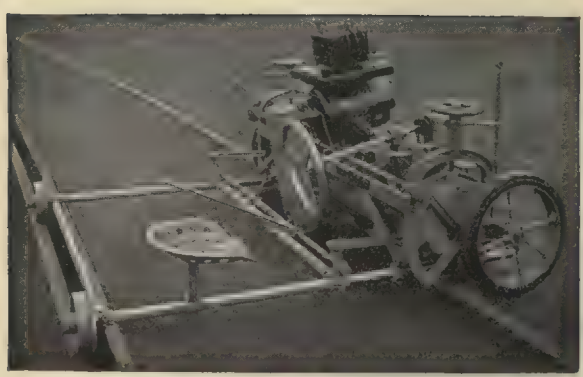


Schematic diagram showing the application of the Rectox polarizing equipment to synchronous converters.

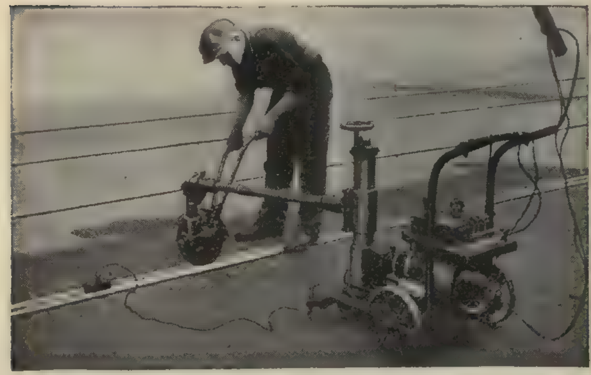
Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

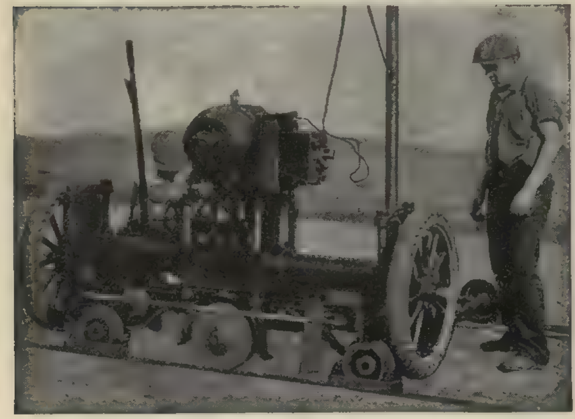
T 31262



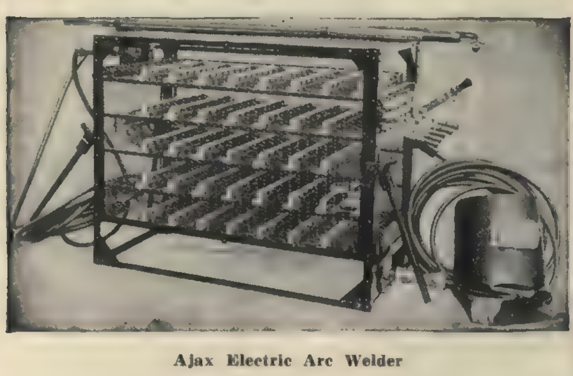
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Design's Bottleneck

Everything you can accomplish by improved design can achieve its purpose only out on your rails.

Every improvement in cars, substation, overhead—even in public relations—will be nullified if your rail produces a noisy, bumpy ride.

Your track is the bottleneck through which every improvement must pass before it can become effective.

Look to your track. Don't let corrugations, low joints and battered specialwork keep your improvements from improving your service. Rejuvenate the track and you rejuvenate the service.

Grinding and arc welding are effective and economical with the equipment we offer.

Write for complete descriptions and quotations. And—for quick delivery—better get your orders in soon.

Railway Trackwork Co.

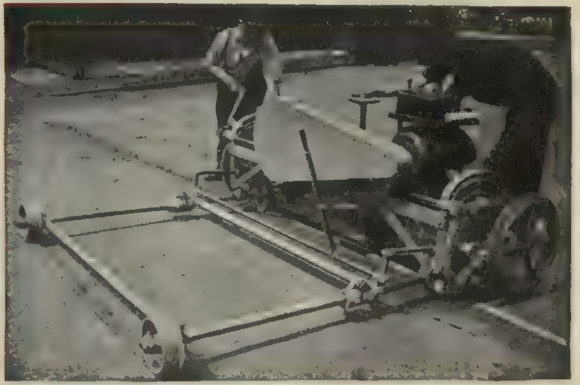
3132-48 East Thompson Street, Philadelphia

AGENTS

Chester F. Gailor, 50 Church St., New York
Chas. N. Wood Co., Boston
H. F. McDermott, 208 S. LaSalle St., Chicago
F. F. Bodler, San Francisco, Cal.
H. E. Burns Co., Pittsburgh, Pa.
Equipment & Engineering Co., London

3535

Reciprocating Track Grinder



Vulcan Rail Grinder

Reciprocating Grinder Car, showing one of the grinding units.

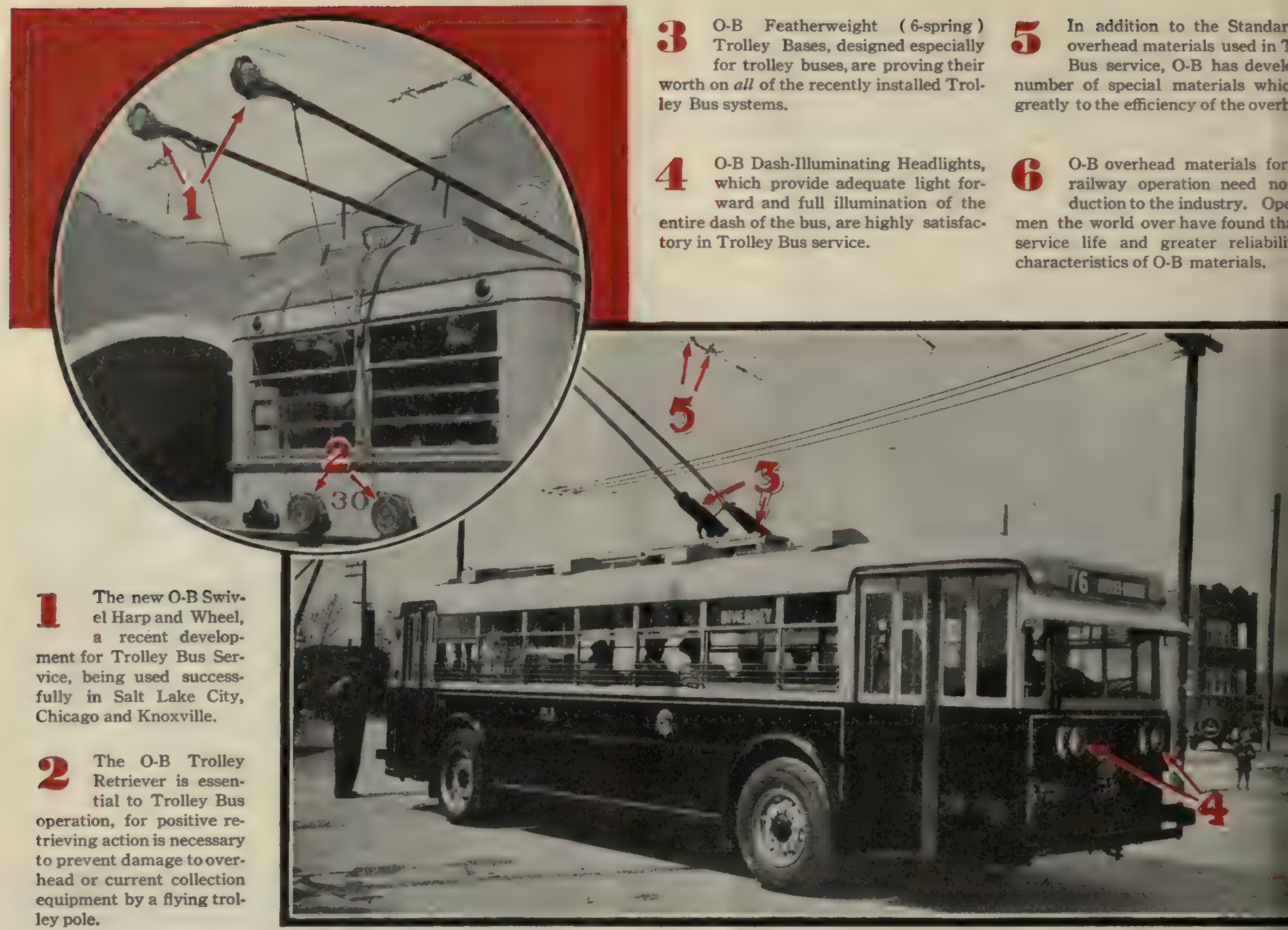
RTW Curve Oiler

3 O-B Featherweight (6-spring) Trolley Bases, designed especially for trolley buses, are proving their worth on *all* of the recently installed Trolley Bus systems.

4 O-B Dash-Illuminating Headlights, which provide adequate light forward and full illumination of the entire dash of the bus, are highly satisfactory in Trolley Bus service.

5 In addition to the Standar
overhead materials used in T
Bus service, O-B has devel
number of special materials whic
greatly to the efficiency of the overh

6 O-B overhead materials for
railway operation need no
duction to the industry. Ope
men the world over have found th
service life and greater reliabili
characteristics of O-B materials.



1 The new O-B Swivel Harp and Wheel, a recent development for Trolley Bus Service, being used successfully in Salt Lake City, Chicago and Knoxville.

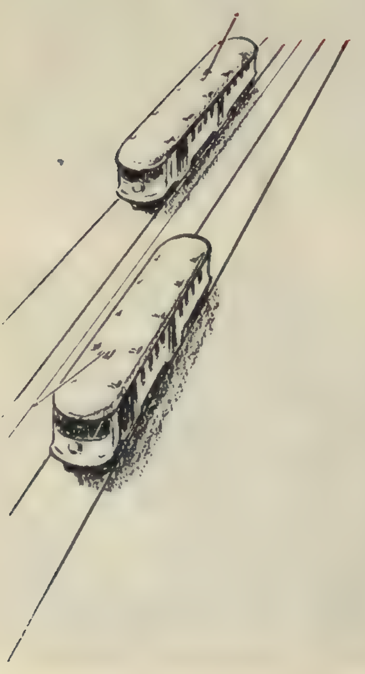
2 The O-B Trolley Retriever is essential to Trolley Bus operation, for positive retrieving action is necessary to prevent damage to overhead or current collection equipment by a flying trolley pole.

12 Factors that Ad

OPERATING expense eats up over 70% of the income from electri
railway operation. Consequently, the problem always paramoun
in the industry is ways and means for reducing this expense. Greate
efficiency, longer life and lower maintenance of equipment and mat
rials are essential if any appreciable reduction is to be effected.

O-B has constantly included these important considerations in the di
cussions of its engineers and specialists—not only when a new produ
is "on the board" but in the study of the older time-tested device
The result has been apparent in O-B performance.

Wherever O-B materials are used, whether it be in the overhead, fo
track bonding, or to equip cars or trolley busses, it is noticeable tha
these O-B products do render appreciably better service—and onl
because research, design, materials and manufacture have each co
tributed a share in the process.



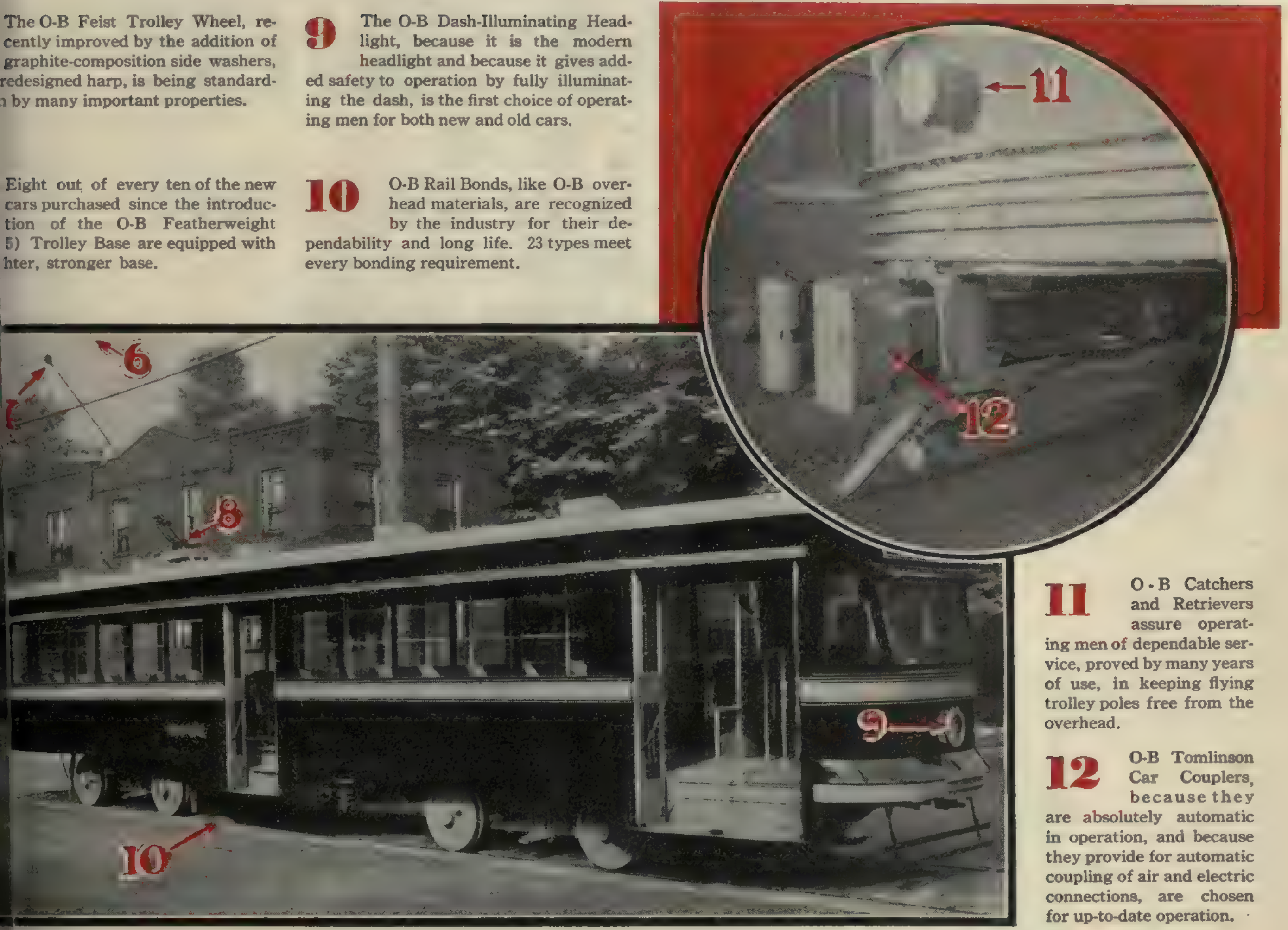
1256G

The O-B Feist Trolley Wheel, re-
cently improved by the addition of
graphite-composition side washers,
redesigned harp, is being standard-
by many important properties.

Eight out of every ten of the new
cars purchased since the introduc-
tion of the O-B Featherweight
5) Trolley Base are equipped with
hter, stronger base.

9 The O-B Dash-Illuminating Headlight, because it is the modern headlight and because it gives added safety to operation by fully illuminating the dash, is the first choice of operating men for both new and old cars.

10 O-B Rail Bonds, like O-B overhead materials, are recognized by the industry for their dependability and long life. 23 types meet every bonding requirement.



11 O-B Catchers and Retrievers assure operating men of dependable service, proved by many years of use, in keeping flying trolley poles free from the overhead.

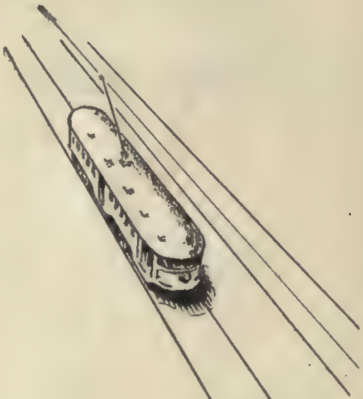
12 O-B Tomlinson Car Couplers, because they are absolutely automatic in operation, and because they provide for automatic coupling of air and electric connections, are chosen for up-to-date operation.

o Better Operation

Te twelve factors illustrated above have proved operating advantages.
Ineither street railway or trolley bus operation, the O-B materials and
euipment indicated by the arrows are rendering dependable, long
lid service, and are aiding materially in reducing maintenance.

Te extensive use of O-B overhead materials, rail bonds and car equip-
mnt by more than 600 electric railway properties in the United States,
Cnada, Cuba, South America, Europe, Asia, South Africa and Austra-
lis ample evidence that the service advantage of O-B materials is
apreciated by operating men everywhere.

Te June A. E. R. A. Convention issue of *O-B TRACTION NEWS*
dicusses the use of O-B materials in many of the leading cities of the
Uited States and Canada. If your copy has not reached you, write
th Ohio Brass Company, Mansfield, Ohio. In Canada, the Canadian
Oio Brass Co., Limited, Niagara Falls, Canada.



Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

STOODY MANGANESE

WELDING ROD

-has actually solved ***manganese welding problems***

APPLIED TO ALL TYPES OF MANGANESE RAILWAY CASTINGS

the deposit from STOODY manganese welding rod *is Smooth, Tough and well amalgamated with the parent metal*

furthermore:

It is furnished for application with either A.C. *or* D.C. Electric Arc or with the Oxy-Acetylene Torch

STOODY MANGANESE WELDING ROD has been subjected to every conceivable test and in each event the results have been conclusive proof of the merits of this welding rod's deposit. The use of STOODY MANGANESE WELDING ROD will completely eliminate much of the necessity for replacement of manganese frogs, crossings and other right-of-way cast manganese units.

Visits to our plant by those interested in manganese welding will be most welcome.

When writing for Sample Rod Please Mention the method of application you will use

STOODY COMPANY

Manufacturers of

Welding Rod ◆ Alloy Steels ◆ Equipment

WHITTIER, CALIFORNIA

"YOU need no elaborate surveys to discover what the Trolley Bus holds in store for your system. A ride on the new Chicago installation with this stop watch in your hand will help do the job."

Twin Coach
BY F.R.FAGEOL KENT, OHIO

The damnedes

ONE of the keenest minded railway managers last week rode a new Chicago Twin Coach Trolley Bus with one of these little truth telling timing devices grasped in his hand.

The route was three and one-half miles long and the trip made during a peak hour.

There were a possible twenty-one stops and eighteen of them were made.

The elapsed time was fifteen minutes.

At the end of the trip he made this comment:

"That's the damnedest ride I've ever had. They have talked about revolutionizing urban transportation. Here is a chance really to do it."

If the capacity and automotive comfort of the Twin Coach body design had been available in the earlier days, there would never have been a gap in the progress of this form of transportation.

ride he'd ever had"

Then he explained this characteristic remark:

"We have all been working for years for a perfect acceleration and deceleration.

"We knew we had achieved the acceleration in the wonderful new Westinghouse and General Electric electrical equipment.

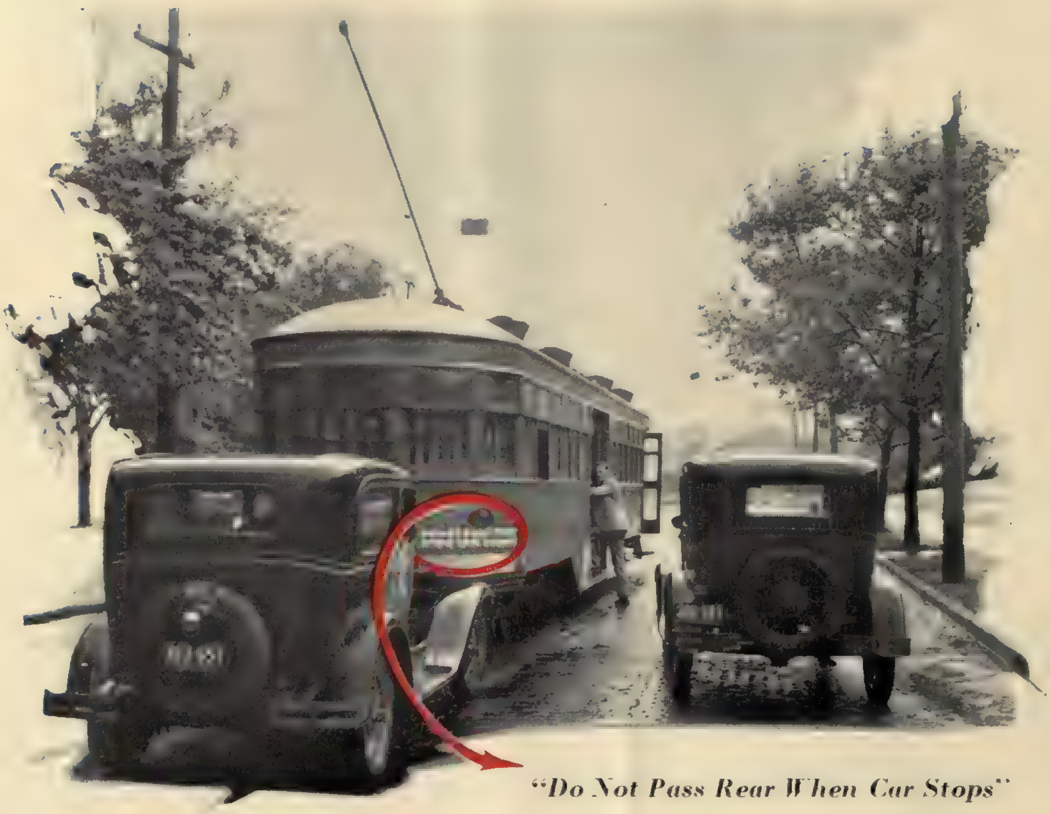
"All of us have marveled at the astonishing deceleration of the big 40-passenger Twin Coach.

"Every mother's son of us has wished we could secure the same perfect acceleration and deceleration in a single vehicle—here we find it in the new trolley bus.

"We must get busy and utilize this new unit on our systems."

The trolley bus modernizes without changing the method of propulsion. It fits your railway maintenance system but provides automotive advantages, including the ability to load from the curb and freedom from noise and odor.

Twin Coach
BY F.R. FAGEOL KENT, OHIO



"Do Not Pass Rear When Car Stops"

WITH the trolley bus in use, each piece of roadway equipment ceases to be a dam in America's city streets.

This economic improvement is inevitable.

With the trolley bus in use, urban transportation may seek the curb—no longer will prospective customers be required to dodge high speed automotive missiles to do business with you.

Twin Coach

BY F.R. FAGEOL KENT, OHIO

IT SHOULD be a great convention. When old friends get together and new friendships are formed. When the whole industry lays its cards on the table and checks up on progress. When policies and programs are mapped out for the next year.

We pause from the busy task of supplying the nation's tickets and transfers to wish you all success and a profitable time.

Our representatives will attend the convention. Won't you look them up?

And don't forget—we have a branch at 420 South San Pedro St., Los Angeles. Make it your "headquarters."

Cordially,

Globe

TICKET COMPANY

Factories
Philadelphia
Boston
New York
Los Angeles
Atlanta

Philadelphia

Sales Offices:
Baltimore
Cincinnati
Cleveland
Pittsburgh
Albany

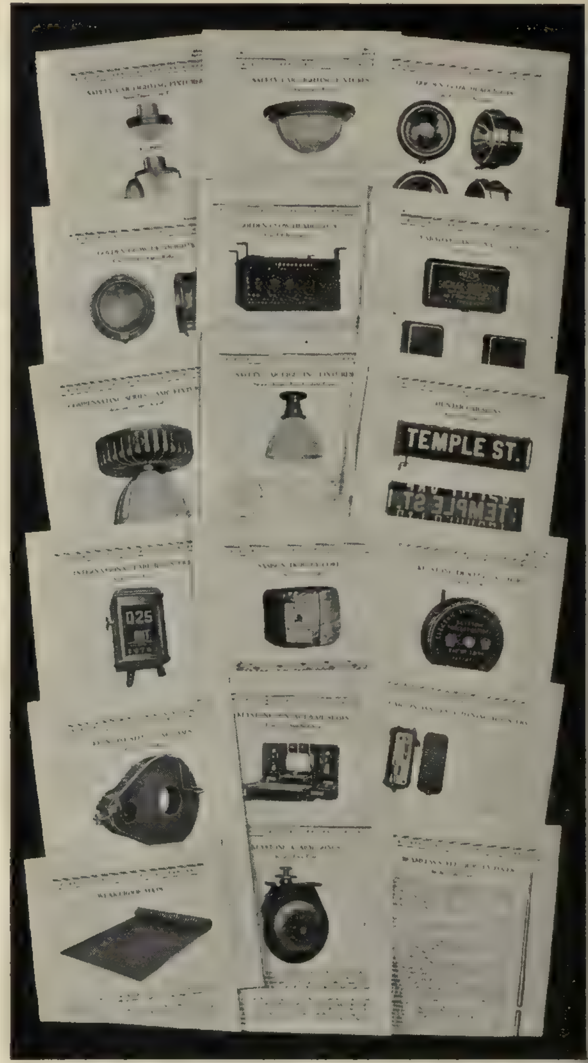
FOR

CAR

EQUIPMENT, REFER

TO OUR CATALOG NO.

7

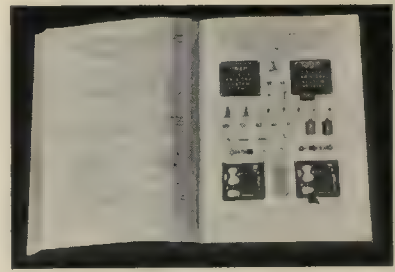


At the right is illustrated a number of pages from the big 687-page catalog listing Keystone Car equipment. This catalog should play an intimate part in all plans for building new cars or when rebuilding or modernizing old cars. Under one cover you will find complete lines of time-tried, profit producing specialties.

Perhaps these reproduced pages will suggest some items of Keystone Car equipment you need today.

If you do not have a copy of catalog No. 7, please write us.

The plant behind the line of Keystone car and bus equipment as it appears from the North Philadelphia station of the Pennsylvania railroad. A plant which houses a personnel thoroughly trained in supplying the electrical needs of all branches of the transportation industry.

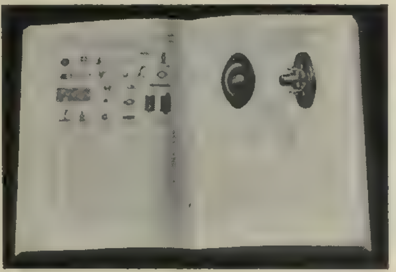


A great deal of effort was put behind the publication of catalog No. 7 in order that you would have first-hand information on all equipment and parts. Since the publication of this catalog a number of supplementary sheets have been issued listing particularly the new interior lighting fixtures. We will be glad to send these to you upon request.

FOR BUS EQUIPMENT, REFER TO OUR CATALOG NO. 9

Check over the pages illustrated at left which are taken from our catalog No. 9—the first and most complete catalog of electrical equipment for buses. Perhaps you will find some items of equipment which should be installed in your buses to make them produce more revenue and to lessen up-keep costs. Bear in mind that Keystone bus equipment is manufactured in a plant which for many years has specialized in the production of equipment for transportation.

Always refer to your copy of catalog No. 9 for bus electrical equipment.



Catalog No. 9 was the first book listing a complete line of electrical equipment for buses. All equipment listed is so catalogued that you will find it very easy to make selections of equipment and parts. A new supplement has recently been issued which we will be glad to send you upon request.

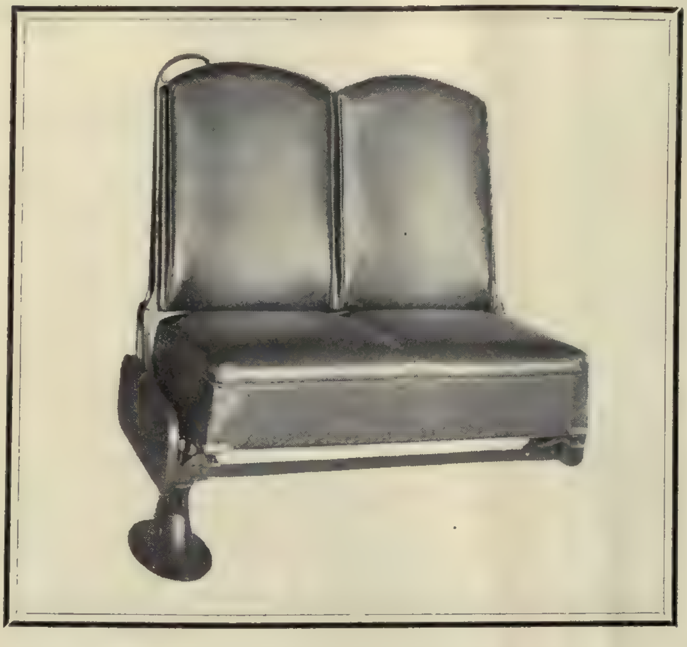
ELECTRIC SERVICE SUPPLIES COMPANY

MANUFACTURER

RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Home Office and plant at 17th & Cambria Sts., PHILADELPHIA; District Offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver, Winnipeg

FOR NEW CARS, OF COURSE



A Hale & Kilburn 392-A Walkover Seat with deep-cushioned double-deck spring-edge cushion and divided concave spring-edge reversible back. Specified by the West Penn Railways and Monongahela & West Penn Railways for their new light-weight cars.

An interior view of one of 15 new light-weight cars recently completed by the Cincinnati Car Corporation for the West Penn Railways and the Monongahela & West Penn Railways. These cars featured Hale & Kilburn No. 392-A Walkover Seats with heat treated aluminum supporting framework and mechanism.

BUT ALSO FOR THE OLD ONES ••

COMFORTABLE seating has so clearly demonstrated its ability to attract additional fares that new cars are being equipped for restful riding as a matter of course. The luxury of these soft and restful Hale & Kilburn trolley car seats is a recognized builder of good will.

Every operating company has dozens, scores or hundreds of old cars which can be modernized with Hale & Kilburn seats. Even a modest budget for the improvement of equipment by installing Hale & Kilburn seats or chairs will go a long way toward making these old cars earn increased dividends.

Why not investigate? Or nearest office will be glad to help you.

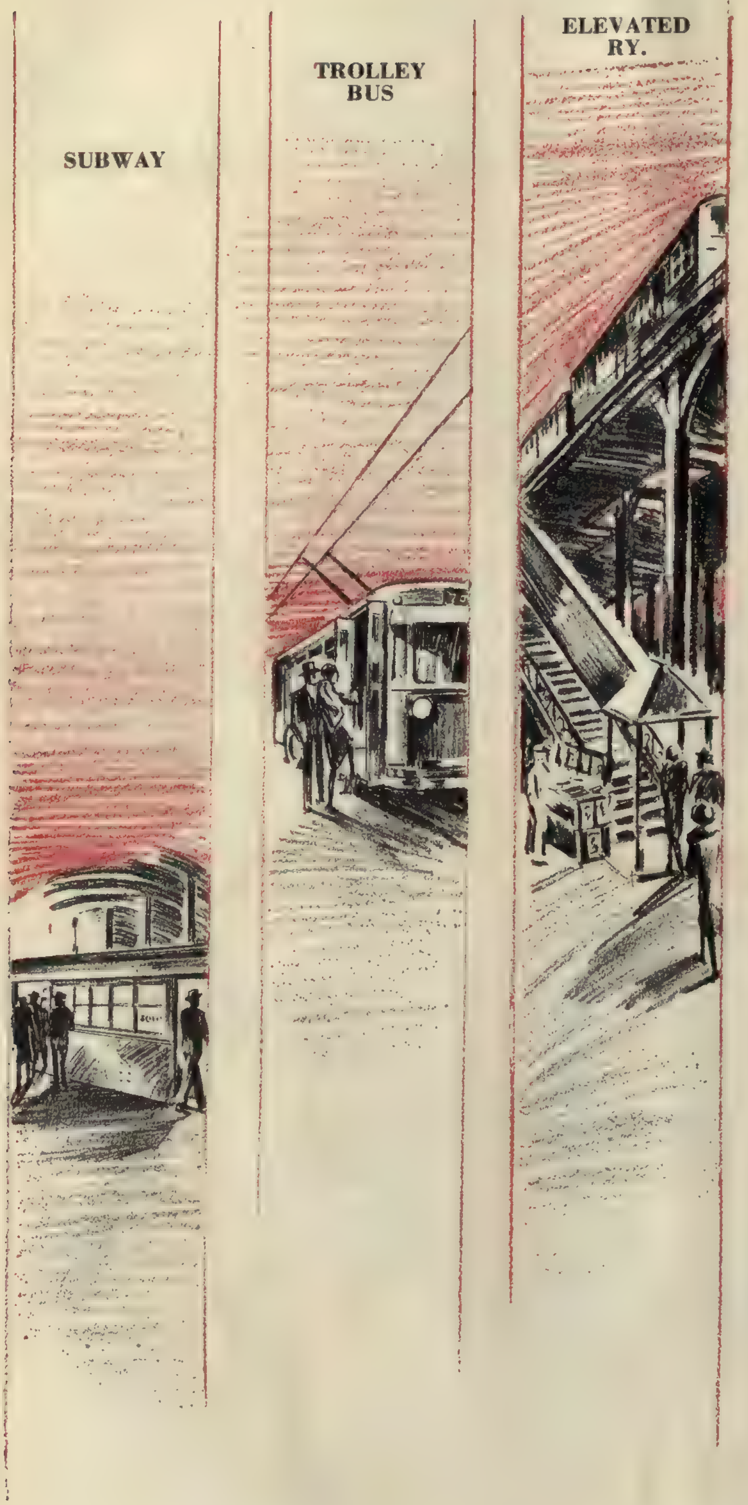
This Hale & Kilburn No. 392-A Walk-over deep-cushioned leather-covered reversible back seat was used by the Market Street Railway in San Francisco in rehabilitating their cars.

HALE & KILBURN SEATS

HALE & KILBURN CO.
General Offices and Works: 1800 Lehigh Ave., Philadelphia

SALES OFFICES

Hale & Kilburn Co., Graybar Bldg., New York.
Hale & Kilburn Co., McCormick Bldg., Chicago.
E. A. Thornwell, Candler Bldg., Atlanta.
Frank F. Bodler, 903 Monadnock Bldg., San Francisco.
W. L. Jefferies, Jr., Mutual Bldg., Richmond.
W. D. Jenkins, Praetorian Bldg., Dallas, Texas.
H. M. Euler, 146 N. Sixth St., Portland, Oregon.



In all branches of Mass Transportation

Safer Operation, Faster Passenger Interchange and substantial operating economies result from the use of N. P. Door Control.

CAN YOU afford to overlook the definite advantages National Pneumatic Equipment offers?

NATIONAL PNEUMATIC COMPANY

A
PROFITABLE
SUMMARY
for
The ELECTRIC
RAILWAY......
INDUSTRY--

During the Past Year the Industry Has Continually Pronounced That There Is A Steadily Increasing Requirement

for

A BETTER CAR WHEEL

This Demand Is Being Met by "NACO SPUN STEELS" —The Large Number of Representative Electric Railway Properties Added Since Last Year's Convention To the List of Many Companies Then Being Served Is ....

A DEFINITE INDICATION

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

THE ULTIMAT

Writ

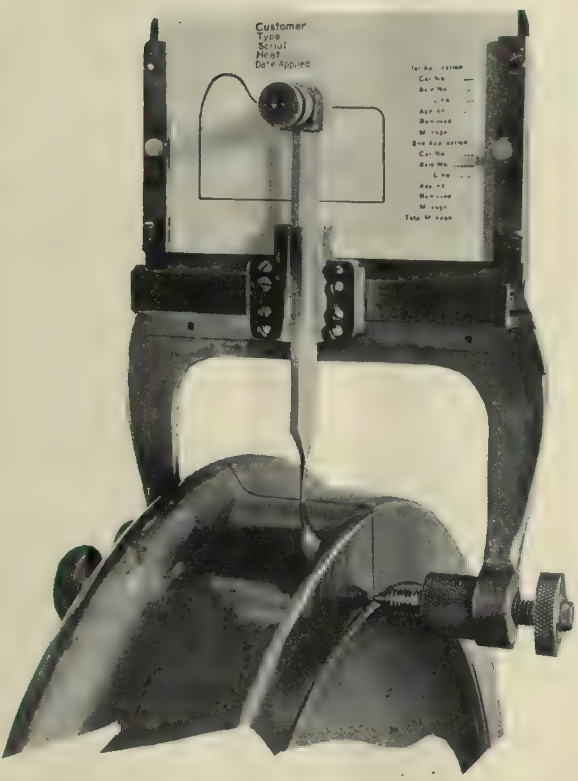
NATIONAL MALLEABLE AND

CLEVELAND

Steel Plants: Sharon, Pa.,

Operators of the Many Properties Now Using "NACO" WHEEL PRODUCT Will Recognize the Device Pictured Herewith As A Simple and Accurate Means For ..... "GETTING THE ANSWER" For Most Economical Car Wheel Service.

READ AND FLANGE CONTOURS RECORDED GRAPHICALLY



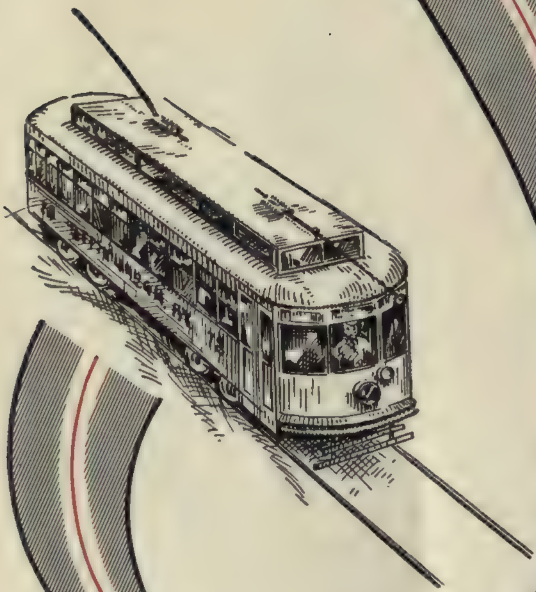
A PRACTICE WHICH WILL ENABLE EVERY OPERATOR TO DEVELOP COMPREHENSIVE FACTS RELATING TO LIFE-SERVICE AND ULTIMATE COST OF THEIR CAR WHEELS

This Practice Is Established and Identified with the Use of . . .
NACO SPUN STEEL WHEELS

CAR WHEEL...

the
STEEL CASTINGS COMPANY
CHIO, U. S. A.
Melrose Park, Ill.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA



SAVE TIME

with

IF street car service is to successfully compete with automotive traffic the ability to make quick stops is essential. Time can be saved in making stops by speeding up brake action—with a Relay Valve, which reduces the volume of air directly controlled by the brake valve. . . . To permit realization of the maximum benefits from this feature, a "self-lapping" brake valve has been developed. With this valve the pressure is not controlled by movement of the handle to service position and back to lap as in the usual type, but the pressure is determined by how far the handle is moved from release position.

WESTINGHOUSE

General Office and Works.

MAKING STOP

self~lapping brake valves

The self-lapping feature simplifies brake manipulation, because the desired pressure can be obtained more readily; eliminates variation in full service pressure caused by governor range, since the brake valve is the controlling factor; maintains cylinder pressure against leakage to that determined by the position of the brake valve handle; permits the operator to "feel" the sensitive performance of the brake and make applications accordingly; and assures flexible brake operation even with the fast rates of application and release provided by the Relay Valve.

TRACTION BRAKE CO.

Wilmerding, Pennsylvania.

The Reason why

COMPARISON OF TIRE PERFORMANCE

	1926	1927	1928	1929
NUMBER OF ROAD DELAYS	254	106	54	27
NUMBER OF MINUTES DELAY	4,470	1,987	1,067	610
NUMBER OF BUS MILES OPERATED	1,852,318	2,130,572	2,660,792	3,254,591

100% Firestone

EQUIPMENT ON *the* WASHINGTON RAILWAY & ELECTRIC CO.

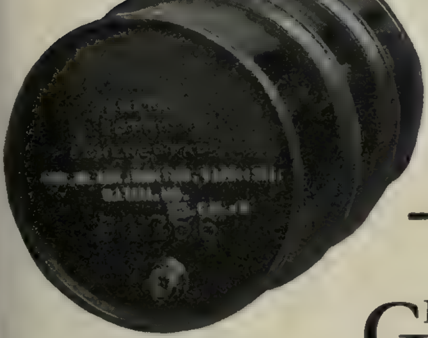
IN MAY, 1926, the Washington Railway and Electric Company was operating 55 buses. Today this company operates 115.

Since May 3, 1926, Firestone has equipped and serviced this fleet 100%. Firestone Gum-Dipped tires with continuous service over a four-year period, has made the above record possible.

Fleets in all parts of the country are experiencing this same performance and economy with Firestone Gum-Dipped Truck and Bus Balloons and Firestone Service.

TIRES RIMS BATTERIES BRAKE LINING

Copyright, 1930, The Firestone Tire & Rubber Co.



G-E Insulating Varnishes for every need in every industry

Where there's G-E VARNISH —there's dependability

GREAT generators, husky railway motors, small electrical apparatus—General Electric dependability is sealed in every one if they're treated with G-E Insulating Varnish.

For a generation General Electric has been manufacturing and using the best varnishes for every purpose . . . using the best of them on G-E products. *You* can use them, too. *You* can benefit by this broad experience.

You need only specify your exact requirements. General Electric can meet them with varnishes high in dielectric strength . . . tough to withstand abrasion, heat, oil, weather . . . flexible or hard . . . quick-baking or air-drying . . . clear or black—*every* kind.

For full data, write to Section M-817 today.

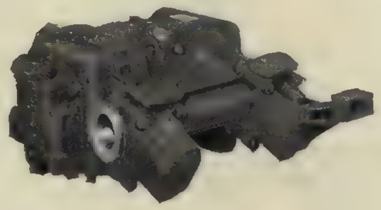
GENERAL ELECTRIC

MERCHANDISE PRODUCTS

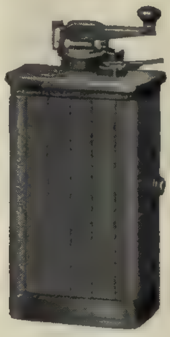
ERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONN.

IMPROVING TRANSPORTATIO

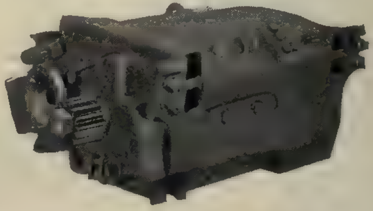
THROUGHOUT the United States, progressive railways are effecting sound economies and improving service with modern General Electric equipment. The following data are an indication of the extent to which various cities will benefit by this modernization.



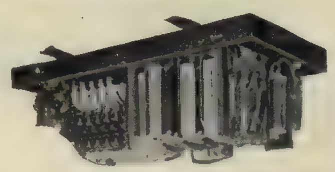
GE-265 motor (35 hp.)



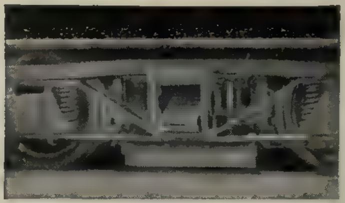
Type K-75 controller with LB control handle



GE-301 motor (50 hp.)



PCM multi-point control for fast acceleration



G-E magnetic track brakes

CARS

BALTIMORE, MD.: 50 light-weight cars with GE-301, 4-motor equipments including PCM multi-point control.

Los Angeles, Calif.: 15 light-weight cars with GE-265, 4-motor equipments including PCM control and CP compressors.

Des Moines, Iowa: 40 light-weight cars with GE-247, 4-motor equipments including K-75 control and CP compressors.

Cincinnati and Lake Erie Railroad Co.: 10 light-weight interurban cars with GE-706 (100-hp.), 4-motor equipments including PC control, magnetic track brakes, and CP compressors.

TROLLEY BUSES

SALT LAKE CITY, UTAH: 14 trolley buses with GE-298, 2-motor equipments including PCM multi-point control and electric braking feature.

Chicago, Ill.: 19 trolley buses with GE-298, 2-motor equipments including PCM multi-point control and G-E air brakes.

Knoxville, Tenn.: 4 trolley buses with GE-298, 2-motor equipments including PCM multi-point control.

New Orleans, La.: 1 trolley bus, G-E equipped, for experimental purposes.

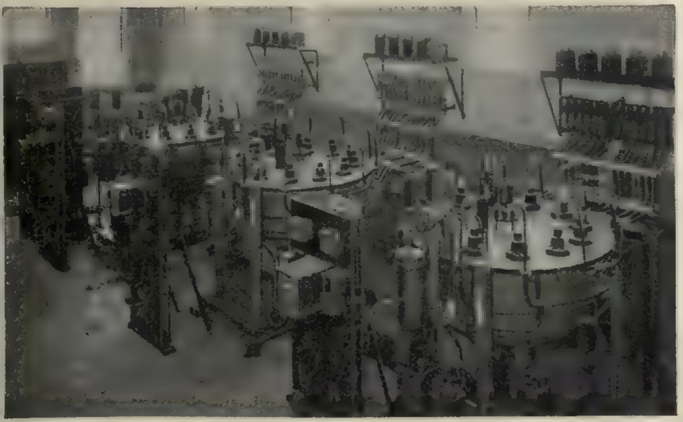
GENERAL
ELECTRIC

G-E equipped trolley buses have won their place in the modern transportation system. Above is shown a G-E equipped trolley bus as used in Salt Lake City

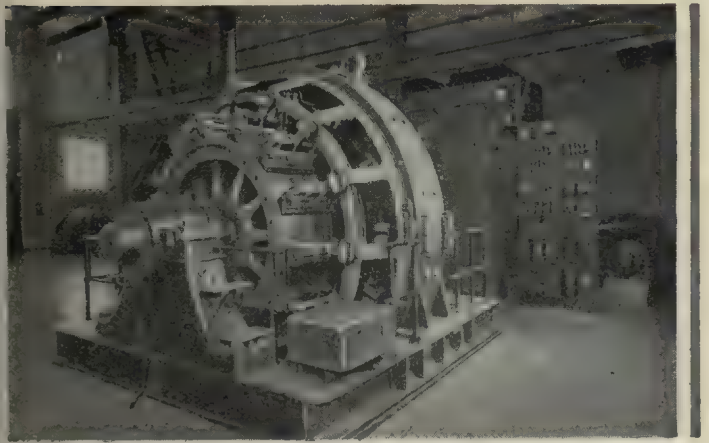
GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YOR

WITH IMPROVED EQUIPMENT

A G-E equipped gas-electric bus of the Public Service Coördinated Transport, Newark, N. J. The ability to increase schedule speeds has always been an outstanding advantage of gas-electric drive



Interior view of the Fall River substation of the Eastern Massachusetts Street Railway Company, showing three G-E mercury-arc rectifiers, each of 1000-kw. capacity



A recent G-E installation of synchronous-converter equipment for the Brooklyn-Manhattan Transit Company of New York City. This shows a 4000-kw. unit at the Bushwick substation

GAS-ELECTRIC BUSES

BALTIMORE, MD.: 12 buses with G-E gas-electric drive. These are high-powered, double-deck, 68-passenger vehicles for one-man operation.

Newark, N. J.: 180 buses with G-E gas-electric drive. These are single-deck vehicles for city service. When placed in operation, they will make a total of 1330 G-E equipped buses operating in Newark.

Philadelphia, Pa.: 10 buses with G-E gas-electric drive. These are for high-speed interurban service between Philadelphia and New York. More than 400 G-E equipped buses are now operating in Philadelphia.

SUBSTATIONS

FALL RIVER, MASS.: Of unusual interest is this new installation of G-E mercury-arc rectifiers. Normally, they utilize 25-cycle power at 13,200 volts. However, the equipment is so designed that in case the 25-cycle power is interrupted, 60-cycle power at 22,900 volts can be substituted instantly. Other G-E equipment at this station includes transformers and complete manual switchgear.

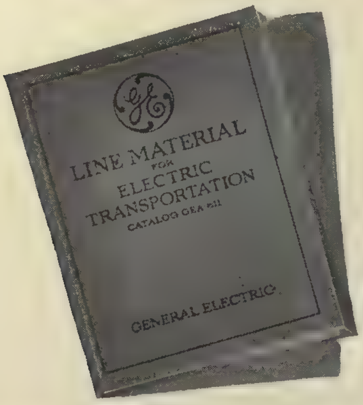
New York City, N. Y.: New synchronous-converter equipment has recently been installed at Ridgewood, Bushwick, and Coney Island substations to improve service on rapid transit lines. Among this General Electric equipment are included manual switchgear and automatic and supervisory control apparatus.

GENERAL
ELECTRIC

GE

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

IMPROVING TRANSPORTATION WITH IMPROVED EQUIPMENT



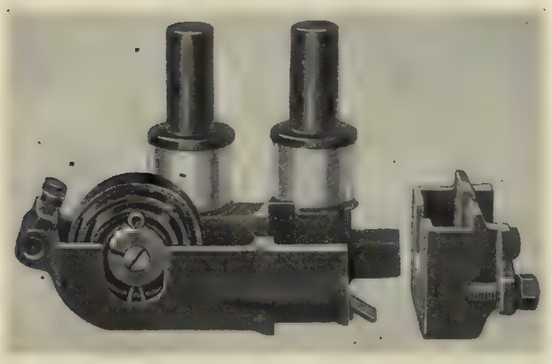
LINE MATERIAL
FOR
ELECTRIC
TRANSPORTATION
CATALOG GEA 611

GENERAL ELECTRIC

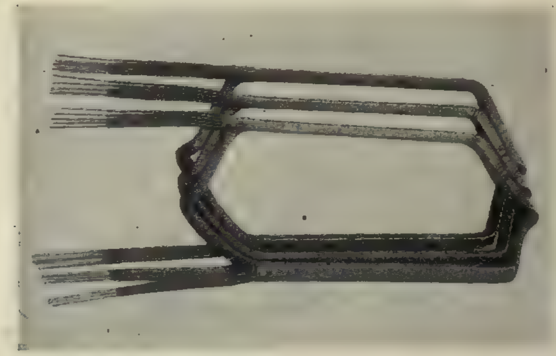
Ask for Catalog GEA-611

LINE MATERIAL

IN order to provide complete information in convenient form, General Electric recently published a new catalog describing all standard G-E line-material devices. Many of these devices embody improvements in keeping with the General Electric policy of making available the best equipment at the lowest possible cost. Ask for Catalog GEA-611



With the G-E renewable-carbonway brush-holder, only the carbonway need normally be replaced



In G-E armature coils are embodied those mechanical and electrical characteristics exactly suited to G-E motors

RENEWAL PARTS

THERE are two definite reasons why General Electric renewal parts for car equipment can help you to reduce operating costs and improve service. First: whether the part required is an armature coil or a pinion, you may be certain that the highest quality is embodied in its design, materials, and construction. Second: General Electric renewal parts can be obtained quickly from any G-E warehouse. These are located at important centers of industry throughout the United States.

General Electric renewal-parts stock rooms are modern department stores for the railway industry. Take advantage of this service. Buy from a single source. It simplifies accounting and storekeeping. It insures original-equipment quality.

JOIN US IN THE GENERAL
ELECTRIC PROGRAM, BROADCAST
EVERY SATURDAY
EVENING ON A NATION-
WIDE N.B.C. NETWORK

GENERAL
ELECTRIC

330-150

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

John A. Miller, Jr., *Managing Editor*

New York, June 14, 1930
Volume 74 *Number 7*

Annual
Convention
Number

Improving Design to *Improve Service*

TODAY, more than ever before, the interest of electric railway men is directed to improving service by improving the design of equipment and physical plant. Among the many problems before the industry none is more vital than this. True, traffic congestion and control is a live issue. Important questions of valuation and rates of fare are now under consideration. Relations between management and employees are being studied intensively. Methods of publicity and merchandising are prominent in the minds of many operators. Means to cut costs are receiving concentrated attention. But the cornerstone upon which rests the whole structure of electric railway progress is the design of equipment and physical plant.

Many advances have been made in recent years. More will be made in the years to come. Where are these trends leading? Are these various improvements separate and unrelated, or are they parts of a definite and correlated program? While at first glance the relationship between the many different developments may not be evident, deep down below the surface practically all of them will be found to have the common objective—to improve the quality of the transportation service rendered.

Of particular interest at the present time are the improvements being made in the electric rail car. For some years the industry has been awake to the need of modernizing its rolling stock. While other forms of transportation had undergone revolutionary alterations, the car, the heart of the electric railway, remained unchanged. It was realized that the electric railway could not continue to hold its rightful place in the transportation field unless the car was brought up to date.

Modernization plans inaugurated during this period are now beginning to bear fruit. Great strides have been made in improving the appearance of cars. Certainly the utility of the vehicle is not impaired by making it attractive. Many improvements have been made which provide greater comfort and safety for the passenger. Operating speeds have been increased by means of more rapid acceleration and braking. Effective means to lessen vibration and noise have been developed by scientific study. Though these may be small things in themselves, in the aggregate they constitute an important contribution toward improving the quality of service.

Less spectacular, perhaps, but none the less important have been the improvements in track construction methods and machinery. Demands on the track structure under conditions existing today differ widely from those of a few years ago. To meet these new conditions, engineers have effected far-reaching changes in design. Likewise, in the field of power conversion and distribution for the electric railway, a variety of equipment is available today which is vastly more efficient and more economical than that in general use a decade ago.

Spectacular growth of our cities has created new problems. Population is increasing and at the same time is spreading over a much wider area. The distance between home and work is becoming ever greater. Heavier demands have been placed upon existing rapid transit facilities, and new facilities have become necessary. Efficient operation of these lines demands improved equipment.

Along with the intensive service in the congested area, there has developed a demand for service in many less densely populated districts. Here the motor bus and the trolley bus have entered the picture. Like the electric car, both have undergone many changes in design which have greatly increased their usefulness.

From every standpoint demands made upon public transportation service are far different today from those of a few years ago. These conditions present a challenge to both the transportation operator and the manufacturer of equipment. That the challenge to improve service will be met there can be no doubt. But that it shall be successfully met demands untiring effort to improve design.

How the Convention Will Benefit the Industry

By

PAUL SHOUP

President Southern Pacific Company
President American Electric Railway Association

THERE is no activity in our national life more important and all-concerning than transportation. For this reason the entire country has a direct interest in the 49th Annual Convention of the American Electric Railway Association. More than 2,000 members of the association from all over the United States and Canada will gather in San Francisco June 23 to 26. These men, actively engaged in the transportation of people and merchandise, will bring to the convention the story of their problems and accomplishments and from the discussion of these topics all of us will receive helpful suggestions and healthy stimulation.

A convention is an institution for the exchange of ideas. The program of the 49th Annual Convention of the American Electric Railway Association covers a wide range of important and timely subjects. Those who come may be sure that the time given to attending this gathering will be well spent.

The electric railway industry should benefit by this convention in other ways as well as from the discussion of its problems. Among those who attend the convention will be representatives not only of the industry itself but also of many western communities. Governors of states, mayors of cities, members of legislative bodies, educators and other leaders in public life have been invited to attend and we have reason to believe that many of these invitations will be accepted—with benefit, I am sure, both to the electric railway industry and to the communities they represent. Understanding is an important factor in progress and there is no better way to develop understanding than by giving the party of the other part a seat at your council chamber.

The development of closer acquaintanceship among ourselves is another benefit of a gathering such as this convention. In the days of the Don, California hospitality was a sacred rite. Those were the days of which the historian Bancroft wrote: "A man could ride from San Diego to Sonoma without a coin in his pocket and never want for a roof to cover him, a bed to sleep on, food to eat, and even tobacco to smoke." In those days transportation facilities were of the four-legged variety and there were no hotels. The visitor who galloped up to the door in the late afternoon expected to spend the night as a guest—and was never disappointed. His horse or mule was given a rubdown and a well stocked stall. The visitor was escorted to the guest chamber where his host waited on him with a basin of water and clean towels. These the host carried himself, but a queue of servants walked behind the master to indicate that had he not wished to show his guest the courtesy of personal service, he could have delegated its performance to hired retainers. When the guest awoke in the morning he found on his bedroom table a clean shirt and a jar containing money—both for his use if he needed them. If his horse was still tired he was given another horse which he exchanged for his own later on the return journey.

On this and similar old Spanish customs, California hospitality was founded. It is the same today as it was 200 years ago, and judging by the plans which have been made for entertaining the visitors to the A.E.R.A. convention, they will long remember their visit to the "land of the Don."

Co-operative Effort

Is Greatest Need

By

J. H. HANNA

President Capital Traction Company

First Vice-President
American Electric Railway Association

SERVICE furnished by the urban and suburban transportation companies is absolutely essential to the welfare of American cities, and if it should be eliminated or seriously crippled the public as a whole would suffer grievously. The business is no longer a monopoly, if it ever was, and while unregulated competition should and must be curtailed, the industry's plans for the future must be based on meeting rather than eliminating competition.

There are probably no more important matters affecting urban transportation agencies today than traffic congestion and the various plans for preventing or correcting it. Unfortunately, many of the studies and plans for improving the traffic situation in cities have been based on a consideration of the movement of vehicles rather than the movement of passengers, resulting in entirely inadequate provision being made for mass transportation vehicles. Parking regulations, traffic lights and signals should be considered on a basis of the greatest good to the greatest number of individuals to be transported. An attempt to handle mass transportation by individual vehicles, either private cars or taxicabs, would result in practical stagnation unless street capacities are doubled or quadrupled.

It is noticeable that in those cities where engineers of transportation companies take an active part in the drafting of traffic regulations and establishing signal systems, the results have been much more satisfactory than in cities where the companies' assistance has not been utilized.

The American Electric Railway Association can do nothing which will be of more benefit to its members and to the public at large than to impress upon municipal authorities and city planners the fact that mass transportation vehicles must be given more consideration in traffic regulation. The vast majority of people now depend upon public transportation service and must continue to do so if traffic conditions are not to get very much worse instead of improving.

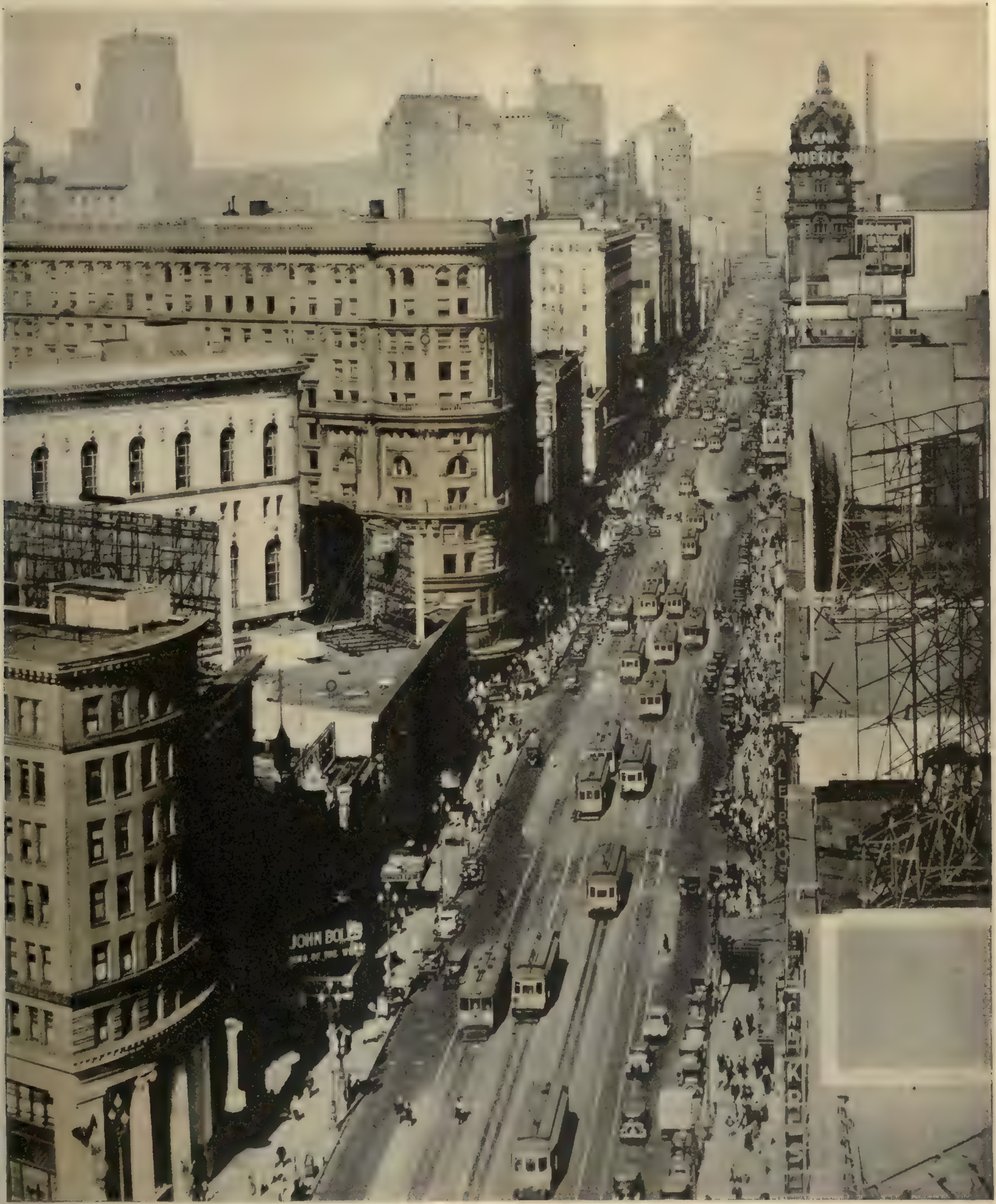
All of these factors emphasize the importance of co-operative effort and call attention to the activities of the association and their importance to every operating and manufacturing company. The present tendency in the association's work is towards detailed technical study of the various elements of the business and it is through such detailed technical study that the industry can improve the value and attractiveness of the service which it renders, and thereby get back customers it has lost.

The Committee on Fare Structures, recently established, has great possibilities. The flat fare for city companies has been considered practically inviolate in spite of numerous efforts made to break away from it in the last ten or twelve years. There is no doubt that the flat fare is economically unsound and has driven away much profitable business. Many and varied plans have been suggested and tried out for the establishment of a more scientific fare scheme but none has so far been entirely satisfactory. It is quite possible that this committee's work may go far towards helping solve the industry's difficulties. In any event, the necessity for co-operative effort has never been so great as at the present time.

Waterfront and downtown business section of San Francisco as seen from the bay

San Francisco, Scene of the 49th Annual Convention of the American Electric Railway Association

Night scene of the convention city



Market Street, with its four parallel tracks, is the main business thoroughfare of San Francisco

DESIGN of street cars is undoubtedly one of the important factors in revamping service to satisfy more nearly present-day demands. Any increase in comfort features, consistent with carrying capacity and loading requisites, is of vast importance. Any improvements contributing to speed, noise reduction and smoothness likewise raise the street car ride in the estimation of the public.

SAMUEL KAHN
President Market Street Railway
San Francisco, Cal.

IMPROVEMENT *in the* RIDE

Is the Most Effective Stimulant of

Public Interest

By

CHARLES GORDON

Managing Director
American Electric Railway Association

ALTHOUGH there is much room for optimism in the electric railway industry at the present time, prompted by the general feeling that its major problems are being attacked with renewed vigor, we should not minimize the great task before us. Eleven years have elapsed since the close of the war, but this industry has not been able to balance its operating budget in the true sense of the word. Its net earnings have been subnormal; the return upon its capital investment has been inadequate, and it has lost ground in number of passengers carried in relation to population increase. In consequence of these conditions, new capital can be secured only with difficulty and at high cost. There is a general feeling, not only in the minds of bankers and investors, but also on the part of the public at large, that the future of the industry is highly problematical.

News of the abandonment of electric railway lines is widely disseminated, and the significance thereof magnified beyond all reason. A large section of the public believes that the future useful life of our surface transportation systems will be comparatively short, and that the electric railway car will soon disappear as the stage coach and the canal boat have done. This lack of confidence in the future of our industry affects us adversely in attempting to attract the capital needed for refinancing and for improvements.

Pleas for public co-operation with respect to franchises, taxes and traffic regulations, as well as for consideration of public along with private transportation in city planning and highway construction do not attract public interest because the average man is not inclined to be interested in an industry which he considers obsolete. There is a strong tendency to overlook the plight of community transportation and of the vital part which it plays in the life of modern cities. This is attributable in large measure, if not entirely, to the impression of obsolescence which is created by the character and condition of the equipment which we operate.

All studies of the requirements of the industry lead to the inevitable conclusion that the cars which we operate represent an important phase of our problem. The industry has for several years been aware of the evils attendant on the operation of the large number of obsolete and heavy cars that are in service. In considering the economics of replacing a large proportion of its present equipment, however, it was faced with the fact that the type of equipment currently offered did not meet present-day traffic requirements to the degree which would warrant the investment. Nor was the evidence as to the economies which would result from the operation of this equipment sufficiently impressive to lead to the belief that replacement with such rolling stock would re-establish the railways upon a firm foundation.

Three interested groups must be considered in any study of the requirements of present-day transportation equipment: the public, the electric railway and the manufacturer. Of all the objectives to be attained in car design, probably the most important are those which are necessary to meet the demands of the public. In this respect, the electric railways must compete with individual automobile transportation, and their cars must be suitable for that purpose. They must meet the requirements of modern conditions, both in their performance and in the impression which they make on the public. They must be in keeping with their surroundings in the modern city. They must be able to keep up with other traffic on the street, and must meet the demand for quick transportation. They must, by their very appearance and by the impression which they make on an observer, create the desire to ride in them. There must not be the slightest hint of being out of style. The American public refuses to be associated with anything which even gives the impression of being out-of-date, and it will tolerate such a thing only so long as it is forced to do so. Future rolling stock must be quiet in operation. It must be smooth and pleasant to ride in. It must be comfortable, convenient, and easy to use. It must, in fact, meet the automobile on its own ground, for the public has become automobile-minded.

From the standpoint of the railway, it must be able to accomplish all these things at the lowest possible cost. In fact, the cost must be far below that of individual transportation. Managements are faced with the problem of providing satisfactory service with a fare which, in most instances, is inadequate to provide the revenue needed to insure adequate returns to investors. Therefore, the question of reducing cost is a vital one to the continued operation of their systems. Considering cost, the car must be light, but care must be taken not to reduce the weight below the point where the high initial cost, through the use of expensive alloys and other costly materials, overbalances the saving resulting from the lighter weight made possible thereby. Its structure must be as simple as is consistent with necessary strength. The possibilities of weight and resulting cost reductions seem to be the most attractive in trucks, motors, electrical control apparatus, braking equipment and miscellaneous apparatus. The many specialties which go into a car, such as seats, doors, trolley retrievers, headlights, etc., seem to offer further possibilities for simplifying the design and reducing the cost.

From the manufacturer's point of view, the many improvements demanded must be made in face of a continual clamor for reduced first cost. The very conditions under which cars are built and sold militates against the accomplishment of this objective. Car building has been largely a contracting rather than a manufacturing business. A builder influences the details of construction, but rarely sponsors the complete unit as a distinctive manufactured product. It has been suggested that the car builders should take the initiative in developing cars to be sold as other manufactured products are sold. On the other hand, some builders hold that street cars cannot be sold in that way because the operating companies will continue to insist upon specifying their own design. Only experience can prove or disprove this point. It is worthy to note, however, that bus manufacturers have succeeded in selling to transportation companies, many of them electric railways, models of their own design.

To meet the public demand for speed in transportation, cars are needed which, as nearly as possible, will accelerate and stop as rapidly as the best powered private automobile on the street and which have a sufficiently high free-running speed to hold their place in traffic. At the present time we have no standards by which to judge the speed of the street car, except by comparing it with its real competitor—the private automobile.

The ideal characteristic curves of acceleration and retardation for a street car have never been determined, nor has the industry undertaken to find the maximum values which may be considered practical. The rates, no doubt, in the end will be controlled by the ability of the standing passenger load to accommodate itself to rapid movement. This involves not only standing passengers during the rush hour, but also passengers walking from the doors to the seats, or vice versa, while the car is moving. The maximum attainable rates of acceleration and retardation cannot be achieved in any city until the public has been educated to conform to higher rates than now prevail. The present-day public is alert and is quick to adjust itself to new conditions.

Transportation men disagree on the relative merits of speed and frequent headway in attracting riders. Both are important. In this respect, there was much discussion two years ago about the use of smaller units brought about by the development of experimental four-wheel cars. Undoubtedly, the idea of a comparatively small unit, operated on a short headway by one man is fundamentally sound for a great many lines in many cities. Only when traffic densities go up considerably above the average are larger units necessary or justified.

The electric railway man has always been susceptible to the temptation to use large units. It seems such a simple way to reduce the cost per seat, or per passenger carried. But of what good is a reduction in cost, if it is achieved by driving away business? Frequency of service, along with speed, is necessary to increase the volume of riding. But even from the standpoint of speed, small units have an advantage over large cars, for speed is affected by the number of stops. The smaller the total load carried on a single vehicle, the fewer will be the number of stops which it is required to make. Putting this whole matter in another way: the smaller the individual unit that is operated, the closer does the service given approximate that of the individual automobile.

The load factor on the system is all too often overlooked in yielding to the temptation to make sure, when selecting new cars, that they are ample in size. The use of larger equipment in the rush hour is, of course, frequently required, but there are cars now available on most properties for that purpose, and in any replacement program, first consideration should be given to equipment for all-day service. This question of the proper size of cars is an important one in considering rolling stock.

The idea behind the single-truck safety car was sound for a great many lines in many cities, so far as its small size and the implied objective of frequent headway were concerned. But the limitations of the existing types of four-wheel trucks were a serious handicap. The appearance and riding qualities suffered. The car looked too much like what it really was—cheap transportation. It is one of the idiosyncracies of human nature that though we demand economy and an attractive price, we refuse to buy a thing that looks cheap if we can possibly find the money to buy something that looks more luxurious.

Improvement in the proportions, lines and general appearance of street cars to the end that they may be in keeping with their surroundings in modern cities is a second very important objective from the standpoint of the public. Here again the standard of comparison is the automobile. The principal object seems to be to make the street car a more graceful looking and attractive conveyance. The same general objective applies to the interior. There must be proper balance between attractiveness and utility. The design, equipment, fittings and decorations should be in keeping with the purpose for which the vehicle is intended; namely, the mass transportation of passengers in cities.

Only during the past few years have we been giving the question of car appearance serious consideration. In this we have been forced to feel our way slowly, because relatively little attention was formerly given to the appearance of street cars. We are beginning to ask the engineers to fit structural details into a design to produce a given appearance, instead of letting the latter take care of itself after the structural elements are determined.

In answer to the steady demand for a smooth and quiet ride, the manufacturers have developed a number of trucks, differing in many respects from the older conventional types. The objectives sought in the designs are reduced weight and noise, faster and smoother starting and stopping with lighter equipment, and reduced unsprung weight. Reduction in unsprung weight is expected not only to improve the riding materially and save wear on the car itself, but also to reduce both noise and wear of expensive special work and tracks. Of almost equal importance is the arrangement of the springs.

Noise has been reduced in some of the newer models by more accurate fitting of gears and other parts, by simplifying the design, and by insulating the springs, brake rigging and other parts from adjoining portions of the structure. The introduction of higher-speed motors made possible by the newer arrangements to support the motors on the truck frame instead of on the axle, has led to the development of several new types of drives. The single-reduction unit, the double-reduction unit and the worm-gear drive are all available for use. The present need seems to be merely the perfection of experimental models and the building up of a record of experience with them that will insure their practicability for the severe conditions of regular service.

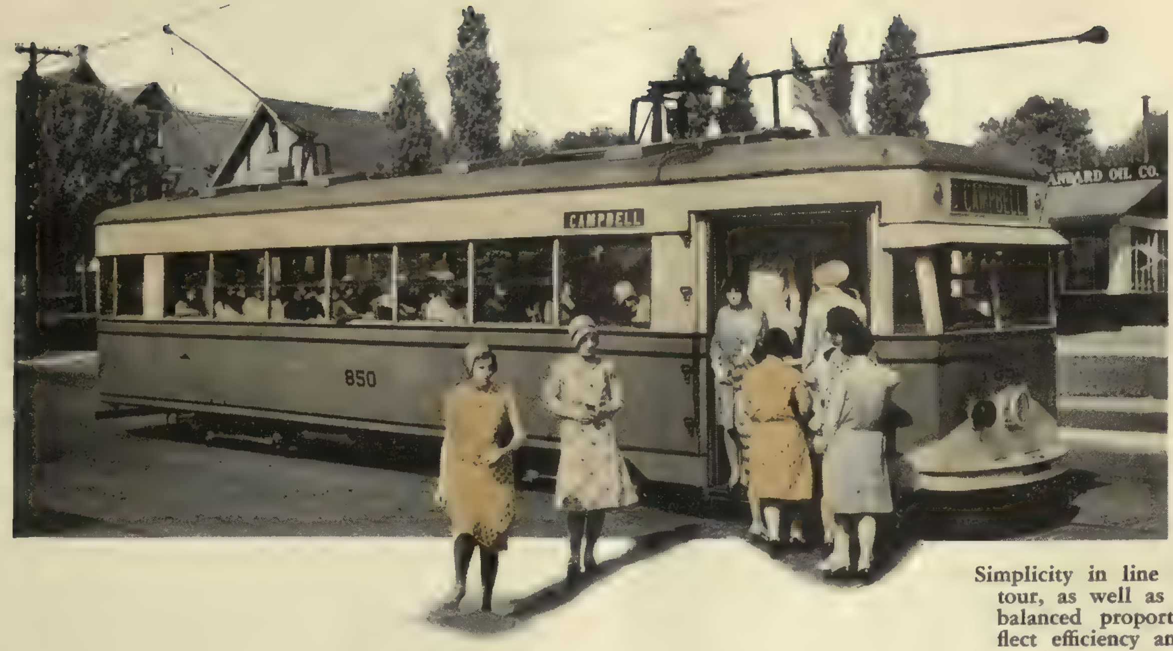
From the standpoint of the operator, one of the most important objectives to be attained in car design is a substantial reduction in operating and maintenance costs. Both are largely controlled by the design, age, condition, performance, weight and first cost of the equipment which is operated. The other important operating elements entering into the problem are labor, track maintenance and power. We cannot hope to reduce the cost of labor except as we use labor more efficiently by increasing car-miles per man-hour through improvement in the performance of cars. We have relatively little opportunity of decreasing track costs, except as we are able to reduce wear and tear and maintenance through reduced weight of cars, better suspension design and reduced unsprung weight. Likewise, the largest opportunity for reduction in power cost is afforded by reducing the weight and increasing the efficiency of our cars.

It is imperative that the cost of new cars be brought down to a point where a retirement period of perhaps ten years becomes practicable. Otherwise, with a continuation of the present rate of progress in automobile design, it is probable that new equipment, even of the most modern type that could be expected to be available within a reasonable time, would be entirely obsolete before it could be retired.

A ride through Mission Park over the private right-of-way of the Municipal Railway affords an unusual view of San Francisco

MANY steps have been taken in improving the physical plant and personnel of the municipal railway to give better service. An extensive track reconstruction program, the purchase of several new buses, the maintenance of equipment at a high standard and the work of an efficient instruction department stand out as the most important of these activities.

F. Boeken
Superintendent
Municipal Railway of San Francisco
San Francisco, Cal.



Simplicity in line and contour, as well as carefully balanced proportions, reflect efficiency and utility in the new Youngstown cars

Obtaining an Attractive Appearance with *Simplicity* and *Utility* in Design

By

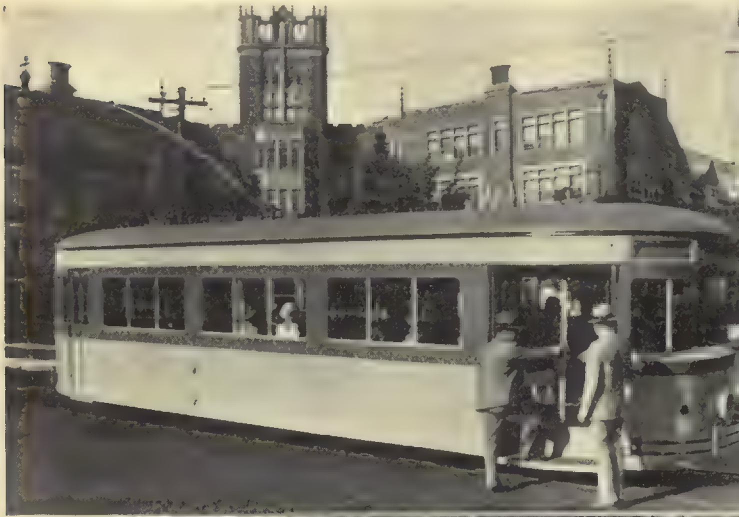
R. N. GRAHAM
Manager of Railways
Penn-Ohio System, Youngstown, Ohio

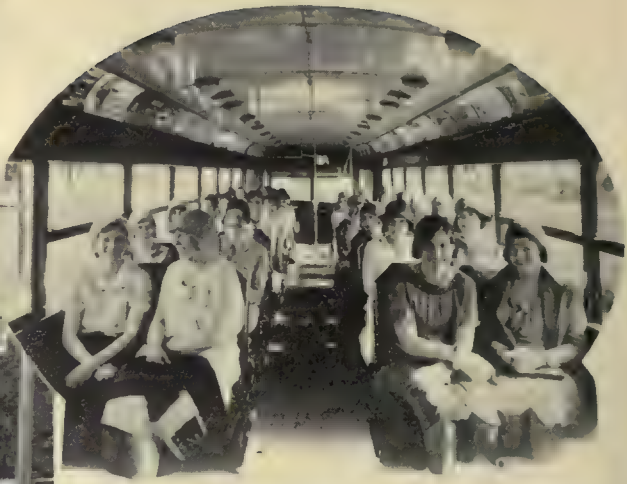
APPEARANCE, external and internal, is a very important feature in the units of modern city transportation. There has been a general tendency in all American cities to devote thought to the impression the city and the component parts of it make upon the individual. Modern buildings are designed with an eye to beauty as well as to mere utility. The urban transportation company can not be alien to the general movement toward improved city appearance.

It has been found that true beauty is harmonious with efficiency and utility. Something added merely for decorative effect we view as "gingerbread" and "Victorian." On the other hand, the harmony in line and contour which reflects efficiency and utility requires studied thought and plan.

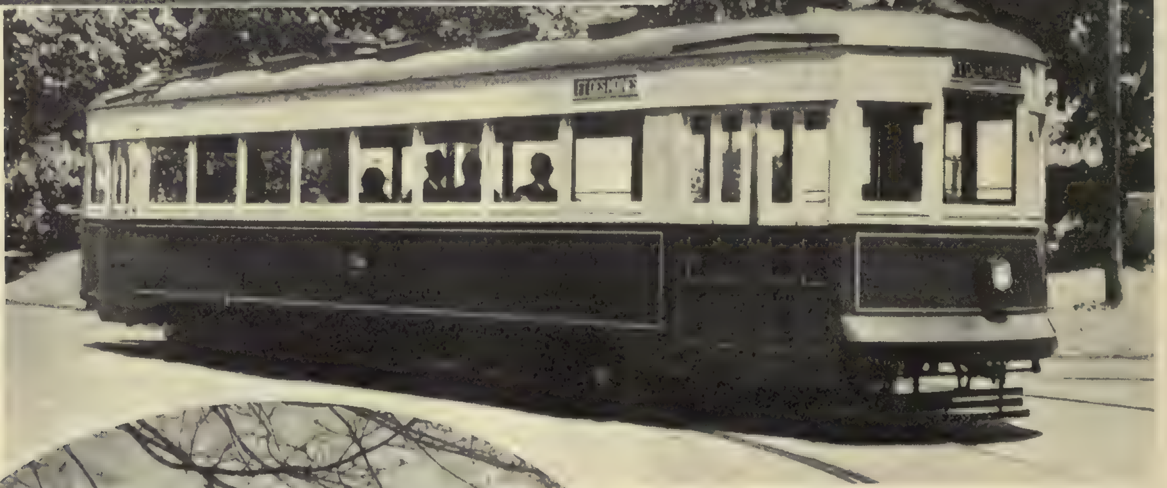
The beautiful simplicity of the exterior of a British or Continental locomotive does not in the least interfere with such a locomotive being an efficient piece of machinery. Neither do the long, sweeping lines of perspective of the modern skyscraper interfere with a most economic use of the cubic space contained in it. There has been a tremendous improvement in the appearance of automobiles in the past ten years. This is not the result of adding ornamental appendages but rather is the result of true artistic effort in so designing the proportions of the surfaces of the automobile that the finished product is pleasing to the eye, not only as a result of beautiful proportions but because the finished product so clearly sets forth the power, speed and comfort of the vehicle.

Although the recently-completed Blackhall car in Joliet is of unusual interest because of its specially-designed single truck, worm drive, low floor and all-aluminum construction, giving a weight of 17,000 lb., it is distinguished also by its striking appearance, obtained by the streamline design and painting, continuous base line, grouped side windows, and pleasing color combinations

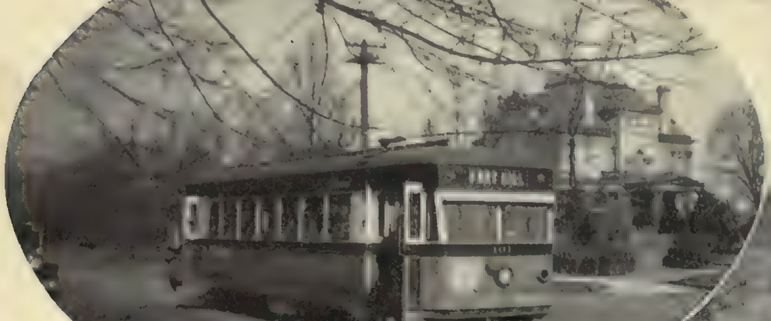




The single sash, composition flooring, leather seats, smooth headlining, dome lights and vestibule paneling give the Youngstown car interiors an air of cheeriness



Visibility is not sacrificed to obtain a pleasing and harmonious color scheme in the new Des Moines cars now being delivered



The square front of this Lynchburg car affords good vision for the operator and also makes possible the most efficient use of the available space

In every detail, the appearance of this Montreal car reflects the purpose for which the vehicle was designed

The modern street ar should, therefore, be well proportioned with the simplest possible lines. Since an extremely bulky object is out of place on the street, the lines of the street car should tend to diminish and not increase its size. For this reason, the roof should be as low as possible. There is no use for vertical space in the body of the car beyond that which is adequate to take care of standing passengers. The cost of the cubic content produced by greater size than this is wasted. A low car of any dimensions is more attractive on the street, and the saving of unnecessary height produces a saving in direct proportion in the vital matter of weight. Since acceleration and retardation, the chief factors of the modern fast schedule, depend directly upon weight, unnecessary height in a car is not only unsightly but detrimental to the efficiency of the car.

Cincinnati's new cars are in keeping with the tone of the fine residential areas in which they operate

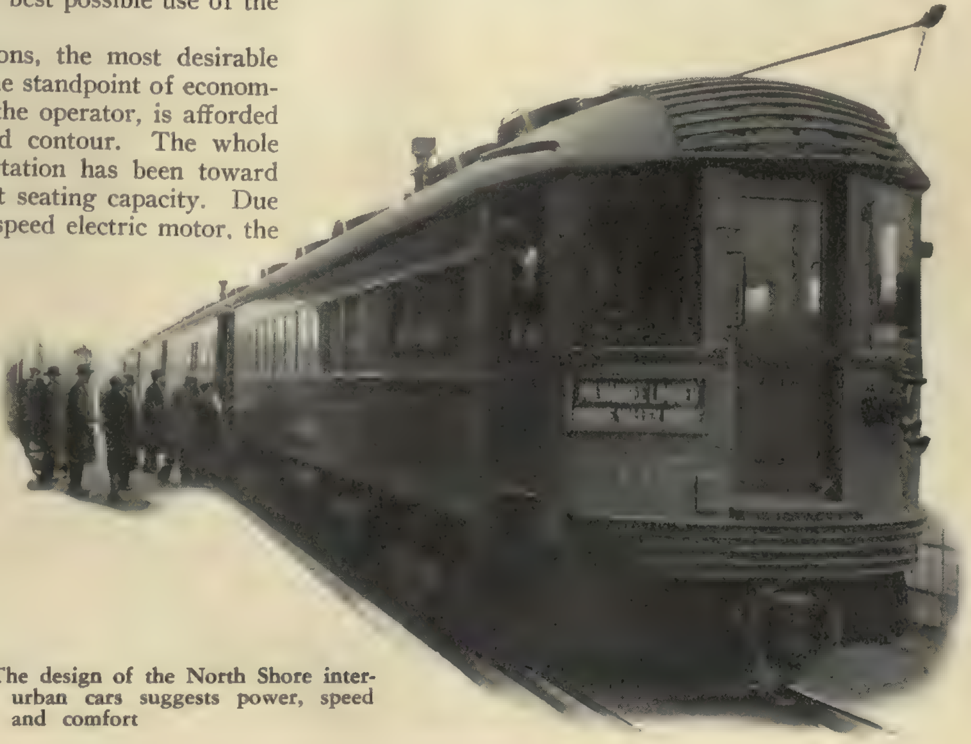
The appearance of bulk in the street car is also minimized through the adoption of single sash. Even though the single sash be as great in vertical dimension as the double sash, it does not accentuate the height of the car as much as the double sash.

Prominent roof construction also emphasizes the bulk of the street car. This construction may result from the roof being too strongly arched, from a monitor deck, from conspicuous ventilators, trolley boards or other appendages. A curved roof with very flat arch and as few added structures as possible makes the most graceful and least bulky roof with the best possible use of the space underneath.

Under modern traffic conditions, the most desirable front end of a street car, from the standpoint of economical use of space and vision of the operator, is afforded by a square and not a rounded contour. The whole tendency in urban bus transportation has been toward the use of buses with the largest seating capacity. Due to the development of the high-speed electric motor, the trolley bus with its high rates of acceleration and retardation has again loomed as an important factor in city transportation. All modern trolley buses have been designed with square ends approximating those of the large capacity urban bus. The street car with a square front end thus will harmonize in appearance with the trolley bus and the gasoline bus, permitting all the essential elements of the modern transportation utility to be harmonious in appearance.

Street cars have been placed in operation in many cities within the last year or two which have shown the appreciation by the designer of the benefit of careful proportion and construction of external elements of the car which reflect credit on the progress that is being made in this important matter.

In choosing the color scheme of the urban transportation system, consideration should again be given to the general effect created on the street. In a city of any size the units of the transportation company, be they street car, bus, or trolley bus, comprise a large part of the picture presented on the street. An essential factor of this effect is color. Color, in looking merely at the street car itself, is one thing; the color of the street cars on the street, when taken along with everything else in the view on the street, is quite another matter. I am firmly of the opinion that orange, which in the past has been a favorite street car color, does not fit in well with the general scheme of things on a city street. It is necessary, from the standpoint of safe operation and the prevention of accidents, that visibility be considered in adopting a standard color. There are a variety of tans, greens, browns, creams and similar colors that can be adopted to produce not only visibility but a pleasing and harmonious appearance. But, whatever colors may be adopted, they should be used to produce an effect of simplicity. If two colors are used, one should be placed


The design of the North Shore interurban cars suggests power, speed and comfort

below the base of the windows and the other above that line; if three colors are used, one below the base of the windows, the second from that point to the roof and the third on the roof. Complicated striping, large ornamental designs, sunbursts and dragons are entirely out of place on a transportation vehicle.

Whatever color is adopted, it must be kept up as a color. Any mercantile establishment in a modern city that looks decrepit and run-down is going to pass out of the picture. A street car or bus that has been painted a distinctive color that has been allowed to deteriorate and become old and patchy is an offense to every one in the city that sees it, whether or not it is realized. The use of modern lacquers makes it possible to restore the color of the transportation unit comparatively cheaply. In no respect can a transportation company make good its boast of furnishing a real service to better effect than by insistence upon keeping up the color of its vehicles.

The most economical floor for a street car is wood. However, there are other floor coverings that have a great deal more passenger appeal that possess no element of frill or "gingerbread" and the use of which is dictated by ordinary business instinct. The three alternatives in most general use are linoleum, rubber and flexolith, or similar mineral preparations.

Linoleum, particularly battleship linoleum in a solid color, presents a pleasing appearance but is more or less subject to wear. Rubber floors are not satisfactory on city cars because of the inability to keep them smooth and level under the conditions of city transportation. Flexolith flooring seems to have no serious defects. While it costs more to install than the ordinary wood floor, it presents a pleasing appearance, is not slippery and has splendid wearing qualities.

Any city transportation unit should be well lighted. The tendency in modern life is to be content with no middle ground in illumination. A street car should be so well lighted that passengers can easily read and so that the cars present a brilliant appearance on the street.

The lights in the car should be carefully placed to insure the best possible diffusion and the highest degree of comfort to the passengers. The latter consideration dictates that there should be two rows of lights from the front end of the car to the rear end, one over each row of seats. The modern dome fixture presents a most pleasing appearance, creates the best diffusion of light, permits lower headroom in the car and is easily cleaned.

Another modern development in street car design is the paneling-in of the air pipes to the air valve, controller and switches. It is another praiseworthy development which has no essential drawback. Of course, in inspecting such apparatus it may be necessary to remove certain panels, and in case of a collision involving the vestibule it may be necessary to replace these panels, but these are comparatively minor factors compared to the positive improvement in appearance. Simplicity should be the outstanding feature of the transportation unit and this simplicity of appearance can not be gained if a miscellaneous collection of pipes, switches and other apparatus clutters up one or both ends of the car.

The tendency in the modern car is to insist upon having headlining. Of course, it should be as light in weight as possible and should be perfectly smooth and painted in a light color to conserve the illumination of the car.

The whole tendency in modern design is to have cross seats the full length of the car. Since a handhold is provided on the corner of every seat, there is no real necessity in the average city of hanging straps. These straps are unsightly, are associated with the cry of "strap-hanger," the relic of an older and unhappier day, and are wholly unnecessary. Stanchions should be as few as possible and should be of non-corroding material.

With large sash, composition floor, comfortable leather seats, smooth headlining, dome lights furnishing brilliant illumination, all machinery concealed, no straps and few stanchions, the interior of the modern street car is an attractive place and it has the true beauty of simplicity and efficiency. It would be less attractive if there were Turkish rugs running down the floor and costly hangings were at the windows, because it has that beauty which comes from adaptation to its purpose; nothing cheap and nothing gaudy. The exterior, too, should express the same ideal.

WELL-MAINTAINED equipment, reliable operating schedules and the general appreciation of business, reflected in our attitude toward the public, have enabled the Napa Valley to retain the maximum patronage and general public good-will, not only essential but necessary to continued operation. Although we have suffered from the competition of the private automobile we have been able to compensate some of the loss in passenger business by increased revenues from other service developed, principally mail, express, freight and motor bus.
C. E. Brown.
Vice-President & General Manager
San Francisco, Napa & Calistoga Railway
Napa, Cal.

Train of the San Francisco, Napa & Calistoga Railway in a beautiful setting along the Napa Valley route

Oakland, sister city to San Francisco, as seen across Lake Merritt

Two-car train of the Key System Transit Company in the business district of Oakland

Buses are operated through the famous Posey tube under the Oakland Estuary, connecting Alameda with the mainland

Along the Key System's trans-bay line which joins the east bay cities with San Francisco

THERE is no doubt that the development of better mass transportation vehicles, both rail cars and motor coaches, is one of the most vital problems in the industry at the present time. Improvement must be made toward faster speed, greater comfort and convenience, longer life, lower maintenance, better appearance and greater appeal to the public we serve.

In spite of many handicaps the mass transportation systems continue to be the backbone of the community, the circulatory system of business and the chief factor in the making and stabilizing of property and business values. Yet the public at large does not understand our most obvious problems and their vital relations to the progress of the community. It is our own job to change this situation. Scientific and sustained effort to improve our equipment will be a very important step in this direction.

A. J. LUNDBERG.
President
Key System Transit Company
Oakland, Cal.

Latest type of car designed for speedy operation on heavy traffic routes in Brooklyn

SPEED —*an Essential of* Street Car Performance

By

W. T. ROSSELL

Vice-President and General Manager
Brooklyn & Queens Transit Corporation
Brooklyn, N. Y.

IT IS difficult for the old and impossible for the young really to comprehend the progress of urban transportation. Within the span of 30 years, the horse-drawn and the "horseless" carriages have evolved into the modern automobile, the hack into the taxicab, the carry-all into the motor coach, the wagon and the dray into the motor truck. At the turn of the century vehicular speed was ordinarily limited to 8 m.p.h. A horse, traveling at 15 m.p.h. was a runaway, causing great excitement. Into this bucolic scene of 30 years ago came the modern electric street railway car, startling in its beauty of line, its power and speed, controlled by powerful air brakes. This product of inventive genius and pioneering courage took its place as the unchallenged leader of urban street traffic.

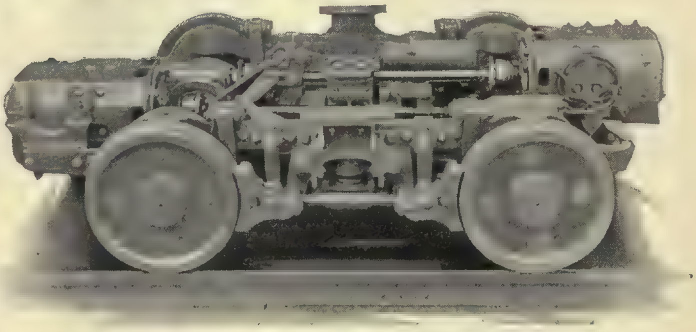
Where are the vehicles of that day? It is as though they had never been. Innumerable models have come and gone. The streets are filled with the rush of automobiles. They seem commonplace now with their streamline bodies, their power and speed, their four-wheel brakes and easy, accurate steering. We accept as natural speeds of 30, 40, even 50 m.p.h. And yet, today, may be seen in many places the identical electric street railway car of 30 years ago moving through the streets The car is the same, but all else is changed.

To bridge this gap is the problem. Public acceptanc of the automobile clearly points the way. Limited by function, street car performance must approximate tha of the automobile. The street car must be made capable of holding its own in traffic. This means more speed, and the bare essentials involved in making greater speed practicable can be classified under the subjects of braking, acceleration, running speed of motors, weight, and rate of handling passengers.

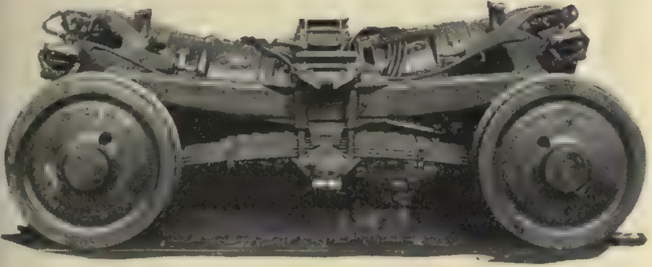
There are natural differences of opinion as to the relative importance of these items. In the following discussion, where figures are given, they are not meant to be arbitrary or final, but merely indicative of opinion.

Wide doors and low steps reduce the loading time to a minimum on the Jefferson Avenue express line in Detroit

Turnstile for passengers with correct fare speeds up operation in Brooklyn

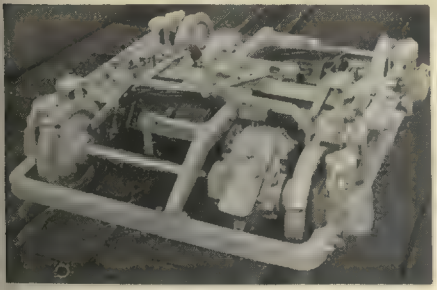


New Brill truck with motors mounted longitudinally, worm drive and wheel brakes



High-speed motors, worm drive and armature shaft brakes are features of the Timken-Detroit truck

Latest Chicago Surface Lines car equipped with four 50-hp. motors for maintaining faster schedules



Brill truck used under recent cars for Youngstown has motors mounted parallel to the axle with WN drive

Safety is presumed to be included in the sum total.

One of the most important steps in automotive design and one which has added greatly to the average speed of traffic is the development and application of the four-wheel brakes. Many street cars have an average braking rate no greater than 1½ m.p.h.p.s. This accounts for much of the slow, hesitant operation, so common to street cars. It is not even as efficient as a one-wheel brake on a rubber-tired vehicle would be. Rates up to 5 m.p.h.p.s. on street cars are possible without a rail brake. The latter would probably be necessary for emergency use and to give the needed assurance. Rates of braking should be variable and selective at the will of the operator. Much progress has been made in this matter, but there remains opportunity for still further improvement.

The power plants now in use in automotive equipment are significant. The "get-away" is the important element in taking advantage of the "breaks." Rates of acceleration should be variable and selective at the will of the operator with a maximum up to 5 m.p.h.p.s. A rapid rate of acceleration should be continued into relatively high running speed.

It is imperative that the passengers be handled gently. Sudden changes in velocity create an accident hazard, make the ride uncomfortable, and discourage the passenger from leaving his seat before the car stops. It should be understood that it is not the high average rate of braking or acceleration that causes these evils, but the momentary sharp changes in rate. Specifically, the rate of change of braking and acceleration must be kept within limits to be determined experimentally.

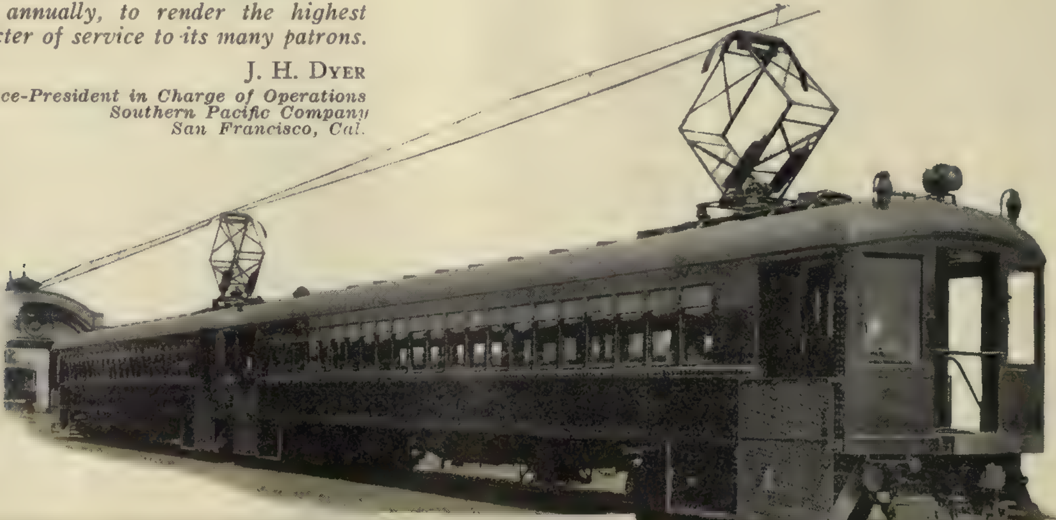
All cities have large areas where vehicles are run at high speeds. Here automotive performance points the way. The same vehicle must have sufficient flexibility to operate satisfactorily in either congested or in free running areas. Whether obtained through series winding, tapped fields, variable line voltage or other means, the ideal is that the free running speed be variable and selective to suit the conditions. A maximum of about 40 m.p.h. is suitable, giving rapid operation uphill and first rate suburban service. A minimum of about 30 m.p.h. is suitable for congested areas. These figures approximate average automotive performance. They may be used as guides and compromised to the extent made necessary by limitations in electrical equipment design.

The control of weight permits higher average speed by keeping power costs within reason. Weight of a 45-ft. car should not exceed 30,000 lb., and should be brought nearer to 25,000 lb. through skillful design and careful selection of materials.

The rate of handling passengers has been given careful study and great strides have been made in improving equipment and method. Besides the training of the operator, many other things also are involved, such as steps and ramps, floor height, door and aisle widths, fare collection devices, heating arrangement, stanchions, hand holds, etc. Specialization of bodily functions of the one-man car operator is an important advantage obtained by foot control.

More and more, the subject of speed is claiming the attention of electric railway operators. Recent improvements in design have done much to increase operating speeds, but the goal has by no means been reached. Every fraction of a second regularly saved per stop is worthy of effort.

> *FREQUENT improvements in the cars to increase their attractiveness and changes in the track to increase the riding qualities have enabled the East Bay Electric Division, which operates 780 trains daily and about 4,000,000 car-miles annually, to render the highest character of service to its many patrons.*
>
> J. H. Dyer
> *Vice-President in Charge of Operations*
> *Southern Pacific Company*
> *San Francisco, Cal.*



Trains of this type are used by the Southern Pacific Railroad on its electrified system reaching the Bay cities of Oakland, Alameda, San Leandro, Emeryville, Berkeley and Albany

Right-of-way of the East Bay Division, leading to the train sheds and ferry slips at the Oakland pier

By

G. A. RICHARDSON
Vice-President and General Manager
Chicago Surface Lines

Second Vice-President
American Electric Railway Association

The extensive trolley bus system recently inaugurated in Chicago serves a well-developed section of the city

The Improved Trolley Bus

Makes a Bid for

POPULARITY

RADICAL changes in the design of the trolley bus, incorporating the best features of both the street car and the gasoline bus and eliminating the faulty characteristics of the earlier vehicles, have definitely brought back this vehicle as a type of transportation worthy of consideration for many kinds of service. Although the first trackless trolley appeared in Germany in 1899 and the first one in this country in 1902, comparatively little progress was made in its development until recently. The earlier types were not satisfactory and as a result the vehicle was not adopted to any great extent. However, the adoption of the light-weight, high-speed motors developed for street railway operation, the use of pneumatic tires, the creation of excellent riding quality, and the building of a large capacity light-weight bus body, equipped for circulating loads, overcame the earlier defects and resulted in a design which has proved to be very satisfactory.

First recognition of the newer models of trolley buses came with the installation of ten vehicles in Salt Lake City in September, 1928, and of eight in Manila, P. I., about the same time. In November, 1929, New Orleans placed two in operation, and in April of this year Knoxville inaugurated a system using four. The largest system in the country was inaugurated in Chicago recently, when a total of 55 vehicles was ordered to serve more than 35.5 miles of route in the northwest part of the city. Detroit is just beginning to operate trolley buses and other cities are seriously considering the installation of this type of vehicle. It appears that it is definitely beyond the experimental stage and well advanced toward widespread adoption.

Analyses of the characteristics of this type of vehicle, its first cost and maintenance expense, its advantages and disadvantages, its performance and the public response seem to indicate that it has a very definite usefulness. Because of varying conditions in different cities and on different routes within one city no definite rule can be stated covering the use of the trolley bus, but general statements can indicate the possibilities.

The type of trolley bus developed for the Capitol District Transportation Company for its Cohoes line in 1924, represented a big advance over previous designs

Briefly summarized, its advantages with respect to the street car are its complete absence of noise and its ability to load and unload at the curb. Among its disadvantages it is to be noted that the smallness of the unit and the difficulty in getting adequate widths of aisle and lengths of platform, make it somewhat slower and more inconvenient for loading and unloading with a large interchange of passengers. Because it is a steered vehicle it operates as do all such large units, in a way that requires more clearance space on a street than a street car, and in weaving from the curb lane out toward the center of the street and back it creates more traffic interference than does a street car on fixed rails with safety zones at the loading points. The rocking of the bus due to the irregularity of the pavement, and the swinging of the unit due to the steering, cause greater inconvenience to standing passengers or those walking to or from the doors than the relatively smoother movement of the street car on good track, provided the street car is one of equally modernized design.

The trolley bus is greatly superior to the gasoline driven bus in that it has more rapid and smoother acceleration, can develop higher schedule speeds on lines with frequent stops, has complete absence of noise, and eliminates entirely the unpleasantness and danger from exhaust fumes. Because of its unlimited supply of power from the trolley wires it has opportunity for better heating, lighting and ventilating. It uses a more effective source of power at a much lower cost per car-hour. The trolley bus can be maintained by the existing shop force trained for street car maintenance, and it does not involve serious fire risk. Because the trolley bus may be treated as a street car in limiting the routes over which it may travel, it is quite likely to obtain permission in all states to build the bus at least 6 in. wider than is permitted for gas buses which are likely to operate at times even on state highways outside of cities. This additional width used for the aisle makes a tremendous improvement in convenience for the passenger. If this width can be obtained it will make an asset out of the use of fixed poles and wires.

Operating Cost Low

The relative costs of operation are much in favor of the trolley bus in spite of the interest on the investment in overhead structure and the maintenance costs of that structure. It is a very slim service indeed that will not justify the additional expense in poles and wire, providing the service is likely to be continued. Naturally, if the investment in trolley structure is already made for street car service, the cost of the changes would be still more easily supported.

In analyzing these differences one arrives at the conclusion that the trolley bus is best suited for service on routes which do not yet have sufficient traffic to warrant street car operation. From an investment standpoint it is more attractive than the street car on such streets because of the lower first cost and because no permanent way is needed. From an operation standpoint the trolley bus is superior to the motor bus because of its ability to maintain a higher schedule speed with maximum comfort to the passenger and at a lower cost.

Because the trolley bus requires only the installation of overhead wires the investment is small enough to be justified when the patronage of the line is limited. With an appropriate increase in traffic, street car operation can be substituted for trolley buses by laying tracks. Thus, the trolley bus serves better than the bus in developing new areas and in serving as an extension for electric railway lines.

In some places trolley buses have been substituted for street cars on routes where the track was in need of complete reconstruction and where the travel was not sufficiently heavy to warrant this additional expenditure. Other installations will doubtless be made for the same

Trolley buses were substituted for street cars on an outlying shuttle line in New Orleans late in 1929 reason. On car lines where traffic has decreased to a considerable extent the substitution of trolley buses may be an economical and satisfactory move. Such a change usually substitutes the new buses for rather old street cars of a less desirable type, and is quite likely to encourage much new riding.

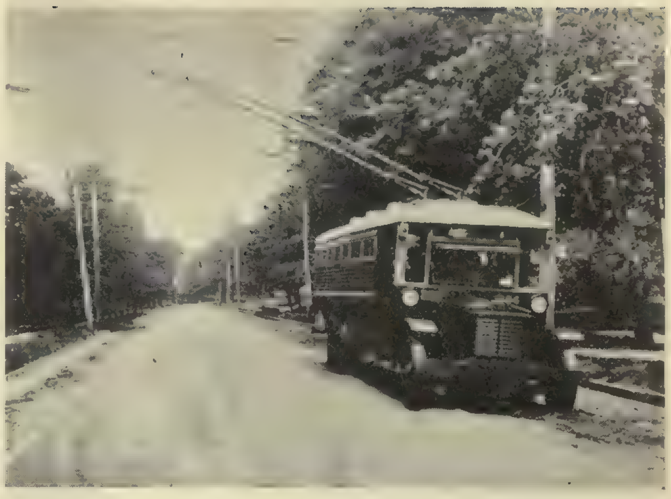
In middle-size and small-size cities, the trolley bus may prove the salvation of many electric railways. In general, patronage is falling off in the smaller cities, due to the competition of the private automobile. Rehabilitation of the track and rolling stock in these communities would no doubt help them in regaining lost patronage and securing new, but few of the railways are financially in a position to undertake such a program. The substitution of trolley buses would seem to be a logical step in the majority of these instances, because the vehicle would be able to give long service, would preserve a large part of the investment, would offer a service comparable to that given by the private automobile and would retain a permanent form of transportation for the community.

Co-ordination of Three Types of Service

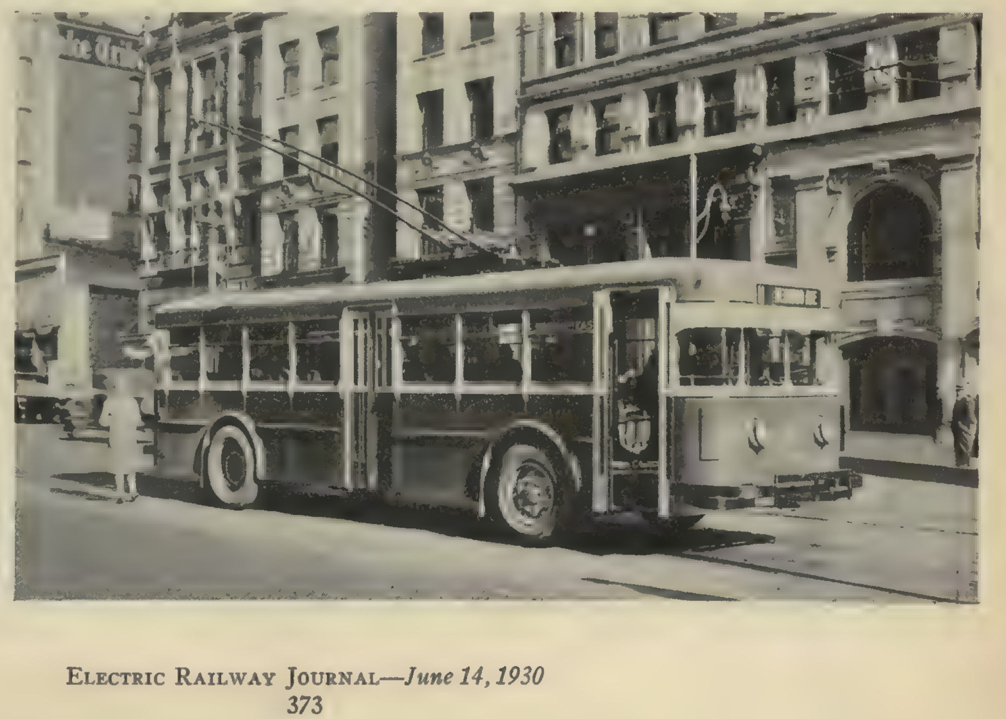
Depending on the size of the city and the number of prospective patrons along any given route, the trolley bus will find varying possibilities as substitution for or co-ordination with street cars and buses. It is quite probable that, as experience with the trolley bus increases and its economic field is more clearly established, the three types of units will be found in operation in American cities all fully co-ordinated.

Although the street car has been improved materially in the past decade, it still lacks a number of the more important characteristics demanded by the automotive minded public of today. Some of these characteristics are possessed by the trolley bus. The great improvements just now being made in street car design will tremendously improve the desirability of the coming street car over anything yet in use, and will retain for the street car a position of good standing as a public carrier unit.

Fundamentally, there is a definite field of usefulness for each of the three types of vehicles. The street car, as improved in the very near future, will retain its position in first place as the right vehicle for public transportation service on heavy traffic lines, except where rapid transit is necessary. The trolley bus can well be adapted for extensions, for some residential streets of a boulevard type, for lines which are too light for the street car and for other supplementary service in co-ordination with the street car or rapid transit. The bus will no doubt continue to prove the best vehicle for extensions into very light traffic areas of uncertain future, for temporary supplements to the permanent forms of transportation, for special express type service or for service along some boulevards and in such parks where the advantage of the trolley bus in giving relief from gases and an excess of noise may be outweighted by the undesirability of having an overhead system with poles and wires.


The old trackless trolley, with truck chassis, high body, projecting hood, heavy railway motors and hard rubber tires

Many factors influence the choice of type of service, and differing weight may be given to the various factors under varying conditions. Modernizing the street car is being undertaken in a very aggressive way, and its material advantage in large cities or in heavy service will remain. The value of the trolley bus will be widely recognized, and to many cities it will prove of tremendous value in restoring public confidence and interest in the public carrier as well as in providing an earning power to the operating company. It is not an equipment that can serve to replace the street car on the important routes. But it is an excellent new development of which the railway organizations should avail themselves for much supplementary service.


Electric coach lines in Salt Lake City extend from the central business district to the residential areas

Spence Airplane Photo

Los Angeles, the country's fifth largest city

At left — View of West Seventh Street in the business center of Los Angeles

The temperate climate of southern California permits the use of open-top double-deck buses the year round

Suburban line of the Los Angeles Railway, using private right-of-way

An unusual view of the Pacific Electric Railway's 3½-mile line from Echo Mountain to Mount Lowe, near Pasadena

Avalon Bay, Santa Catalina Island, a beautiful resort 18 miles from Los Angeles harbor

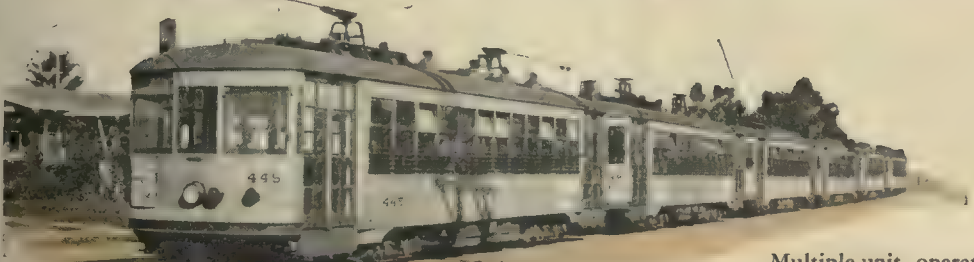
San Gabriel Mission, one of the many points of interest in the territory served by the Pacific Electric

Of paramount importance to the suburban and interurban railways is the cultivation of the good will and constant patronage of the commuter. He is the regular customer—the standby we can count on throughout the year; and, to him, we owe first consideration.

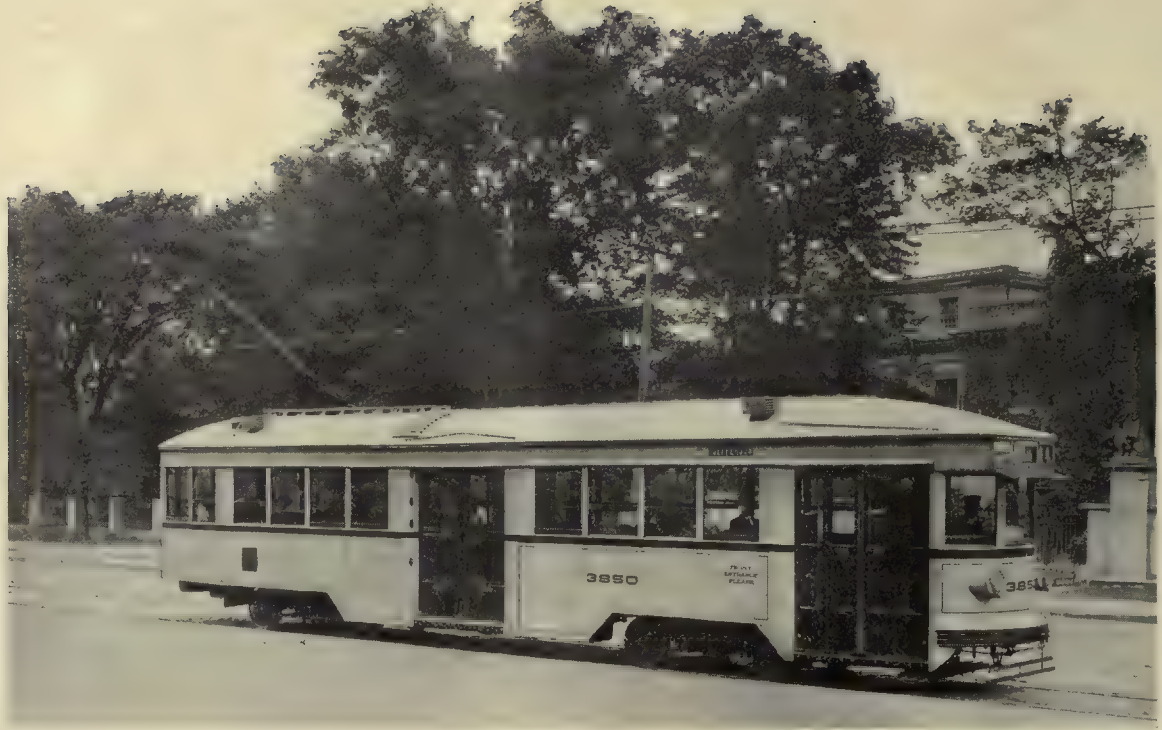
He has been taken very largely into account on Pacific Electric properties in the purchase and rehabilitation of equipment. His comfort has been provided for in seating, lighting, heating and ventilation; and in car arrangement and other appurtenances, his desires have been thoroughly studied. Schedules have been rearranged to meet his needs best. Monthly passes have been adopted, for he prefers them. And in his journeyings he has been surrounded with an atmosphere of ease, comfort and quietude, and the courteous attention of skilled trainmen. D. W. Pontius

President
Pacific Electric Railway
Los Angeles, Cal.

San Diego and its harbor as viewed from the near-by Coronado shore



Multiple-unit operation on the San Diego Electric Railway



This sample car in Detroit embodies practically all of the latest noise reduction features—light weight, reduced unsprung weight, insulated floor, worm gearing, insulated trolley base and special air compressor mounting

Lowering Costs and *Bettering Public Relations* by REDUCING NOISE

By

H. S. WILLIAMS

Assistant Superintendent of Equipment
Department of Street Railways
Detroit, Mich.

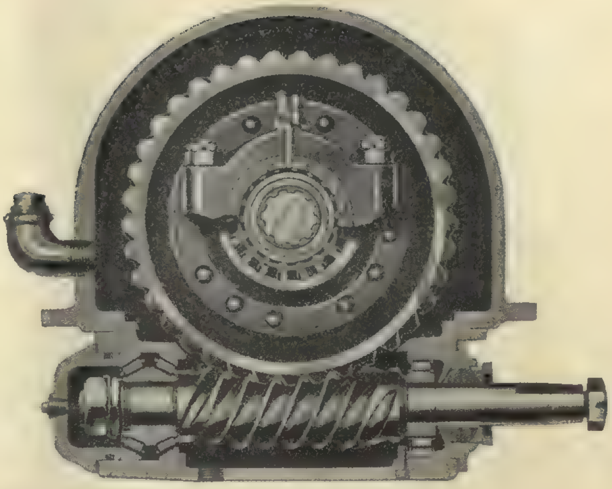
IS NOISE reduction worth while, or is it merely something which would be nice although not of sufficient importance to justify the effort needed to obtain it? We have demonstrated in actual practice that cars can be made much quieter than they are. We know that this is a vital thing and it can be proved that it is the practical thing to do.

Quite naturally one of the first considerations is the cost. With railways striving to make every dollar yield its utmost in value, this aspect of the case must be of prime importance. It is fair to assume that if it can be proved that noise reduction can be accomplished with a saving in maintenance expense it will be adopted, for economic practice is the only one which will survive.

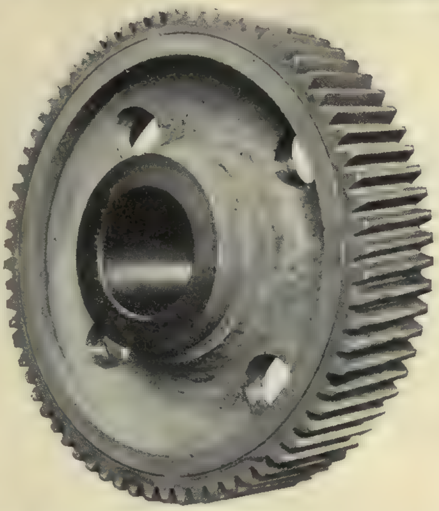
Common sources of noise in a street car are loose parts. These parts vibrate or by rebounding set up vibrations which are interpreted as noise. For example, take the motor axle bearing. When this is new its movement in the vertical plane is so nearly zero as to be negligible. When wear sets in, the movement is increased and heavy hammer blows are delivered, which mean noise. In the initial stages of service a wear of 0.001 in. means a life of approximately 5,000 miles, but when the bearing has worn so that the clearance between axle and axle bearing is $\frac{1}{16}$ in., a wear of 0.001 in. means a life of only 500 miles. It is at this state that it becomes a noise producer of consequence.

Let us now examine the economics of this case. The bearing is worth approximately $6 installed. It has produced, up to the time represented by the $\frac{1}{16}$-in. wear, a mileage of 69,000. If the bearing is allowed to run to double this wear, the total mileage amounts to but 77,000 or an increase of only 8,000 miles. (See ELECTRIC

Gearcase pad of the Chillingworth Manufacturing Company for muffling the gear case which otherwise acts as a sounding board



Cross-section of Timken-Detroit Axle Company worm-gear driving unit. This type of gearing effectively eliminates noise



Quiet gear of the Westinghouse Company, using a wrought-iron band welded at several points to the gear rim

RAILWAY JOURNAL, issue of Feb. 19, 1927, p. 347.)

If the bearing be removed at the end of $\frac{1}{16}$-in. wear, the cost per 1,000 car-miles will be 8.7 cents, while if allowed to run to a wear of $\frac{1}{8}$-in. the cost per 1,000 car-miles will be 7.8 cents and the net saving will amount to 70 cents. To secure this saving, it is necessary to consume an excess amount of energy amounting to approximately $6.55. This figure represents the frictional loss in the bearing during the added 8,000 miles which is equal to the loss occurring during the previous 69,000 miles. Summarizing this phase of the problem, it has cost $6.55 to save 70 cents.

This only the direct saving by taking the proverbial stitch in time. In addition to this is added gear wear caused by allowing abnormal separation of gear centers. This in turn lowers the efficiency of the gears. The gear loss from a set of spur gears when new and operating under the best of conditions is approximately 2 per cent. If we allow an added loss of 0.1 per cent for the spread centers, a conservative estimate, then with an 18-ton car in ordinary city service an added energy loss of approximately 45 cents per bearing is entailed. This amount should be added to the $6.55 previously mentioned.

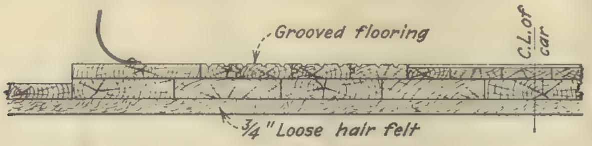
In addition to this is added gear wear greater than the normal wear. It is difficult to evaluate this factor, but it is present and a very definite thing nevertheless. Moreover there is the intangible nuisance of noise which has been added to the sum total of other noise of the car. In an age like the present where everyone is becoming noise-conscious there can be no question that noise suppression has a value even though it is impossible to reduce it to dollars and cents as concerns its reaction upon our patrons.

To sum up the above case, the bearing which has been allowed to run its limit of wear instead of being changed when it should have been, has given an increased mileage of 8,000, or 11.6 per cent, and represents a saving of 70 cents. But to secure this saving it has cost $7 plus added gear wear, plus the annoyance of noise. So in reality there has been an economic loss of $6.30 per bearing in addition to the intangibles mentioned. Such a thing is indefensible.

We have taken this case of delayed maintenance because we have definite data concerning it upon which to build a case and which we can prove to be true. Other

"Quiet" type car of the Market Street Railway, San Francisco, fitted with sound deadening materials under floor, rubber padding between car bolster and frame, leaded master gears, insulated gear boxes and quieted air compressors wearing parts of the car are in the same category and wear proceeds in a similar fashion in them. Delayed maintenance and its consequent noise is much more expensive than maintenance applied at the proper time. Perhaps it might be better to say that reconditioning of parts in the early stages of wear is true maintenance, while letting wear run to the limit is nothing but repair. True maintenance is something that is orderly, scientific and economical; repair is a slipshod makeshift and very expensive.

Having shown that noise reduction means cost reduction from the maintenance standpoint, let us now look into some of the features which should be built into cars to make them inherently quieter. One of the points of greatest importance under this heading is weight reduction, especially the reduction of unsprung weight. Much thought has been devoted to this idea and a great deal has been accomplished in a developmental way. To be sure, the great objective has been reduced operating cost but the noise-reduction value of the lighter weight should not be overlooked. To give an idea of this expressed in percentage it may be stated that if the weight of a car be decreased 10 per cent, the noise due to wheel impact will be reduced 3.64 per cent; if the weight be reduced 20 per cent the noise will be lessened by 7.72 per cent. Inasmuch as noise due to wheel and rail contact is one of the major sources of annoyance, the reduction of weight is very important.



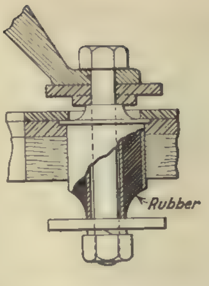
Floor design of the Detroit Department of Street Railways using a ¾-in. layer of loose hair to absorb sound

Gearing is another important source of noise. Spur gears with large teeth which have been standard up to the present time are prolific noise generators even when new and, of course, to a greater degree after wear has set in. The remedy for this on present equipment is to muffle the gear case which acts as a sounding board. This has been done effectively by the Chillingworth Company which has perfected a padding for this purpose. The Westinghouse-Nuttall gears have the ringing deadened by means of a wrought-iron band welded at several points to the inner side of the gear rim. A lead-filled groove is used by the Tool Steel Gear & Pinion Company for damping the ringing of gears. Were it not for imperfections in the gear teeth resulting from heat treatment, there would be greatly lessened demand for means to stop gear noise. Another efficient method of elimination of gear noise is to use worm gearing, a typical example of which is shown in an accompanying illustration.

As the greatest proportion of car noise originates beneath the car floor, the comfort of passengers will be greatly helped by the use of sound absorption material under the floor. There are two methods of doing this which have been tried out in actual service and which have proved satisfactory. The plans developed by the Market Street Railway of San Francisco and the Department of Street Railways, Detroit, are shown in accompanying drawings. The latter scheme by actual measurements shows a reduction of noise as heard by the passenger of 8.9 per cent.

The side sheathing of car bodies may be effectively sound-proofed by a method similar to that used for flooring in Detroit, but in this case the material should be cemented to the steel panels.

Trolley-wheel noise is annoying. It may be conquered, however, by the employment of a trolley base mounting as illustrated. Tests have shown this to be so effective in city service that no sound could be heard except when the wheel passed an overhead frog or crossing. The vital point in this mounting is that the rubber is used in tension. Rubber when used as a vibration insulator is much more effective when it is in tension than when in compression. The noise of air compressors, too, may be minimized by the use of mountings similar in nature to those employed for trolley bases.

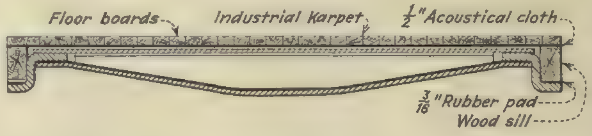


Method of mounting trolley base to eliminate noise. Rubber is used in tension rather than in compression

Often in fitting new pinions to worn gears, both in the case of car propulsion motors and air compressor motors, the profile of the new pinion does not properly match that of the used gear. Recently we have used a new lapping compound to run in the pinions with success.

The points previously discussed are a few of the major points having to do with the car equipment. What of the track? That, too, has a most important bearing upon car noise. Rail, in order to contribute its share to the reduction of noise, must be smooth; it must be free from corrugation and loose or cupped joints. It should have flange bearing crossovers. It must have a measure of resilience so that sound vibrations will be absorbed or damped. A soft and rough surfaced paving will be quieter than a hard smooth surface. The modern monolithic type of track construction in which concrete pavement is integral with the track ballast is a serious offender to the noise sensitive public.

Car noise is not merely a nerve irritant. It bears a direct relation to cost in a different way than has been pointed out previously. Noise in many instances is an indication of something wrong—that reconditioning has been too long deferred. But noise is basically a vibration of parts and that in turn is an indication that metal parts are being subjected to millions of successive stresses. This in turn leads to fatigue of the metal and failure of parts. Consequently whatever may be done to reduce noise has a beneficial bearing upon the life of equipment



Industrial Karpet, acoustical cloth and rubber padding are used by the Market Street Railway for floor insulation

The subject of noise reduction is being given much study by different bodies. The electric railways and automotive concerns are interested in it to make their transportation vehicles more popular. The National Safety Council is studying it to determine its effect upon the nervous systems of workers. Civic bodies are taking up the question and demanding the suppression of noise. To summarize then, noise reduction is necessary from the eocnomical standpoint, from the humanitarian view and because of bettered public relations.

Plush-upholstered seats and a combination hot water and electric heating system, add to the comfort of passengers on the latest type of North Shore car. A thermometer and thermostat may be seen above the windows on the right

By

H. A. OTIS

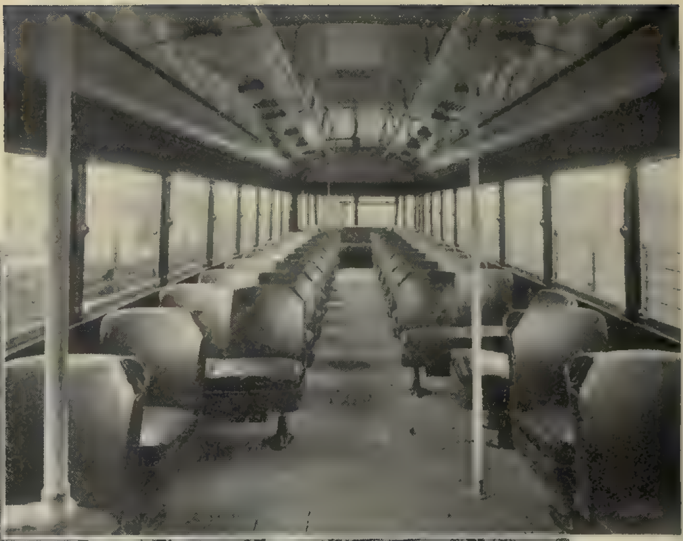
Engineer Car Equipment
Chicago Rapid Transit Company
Chicago, Ill.

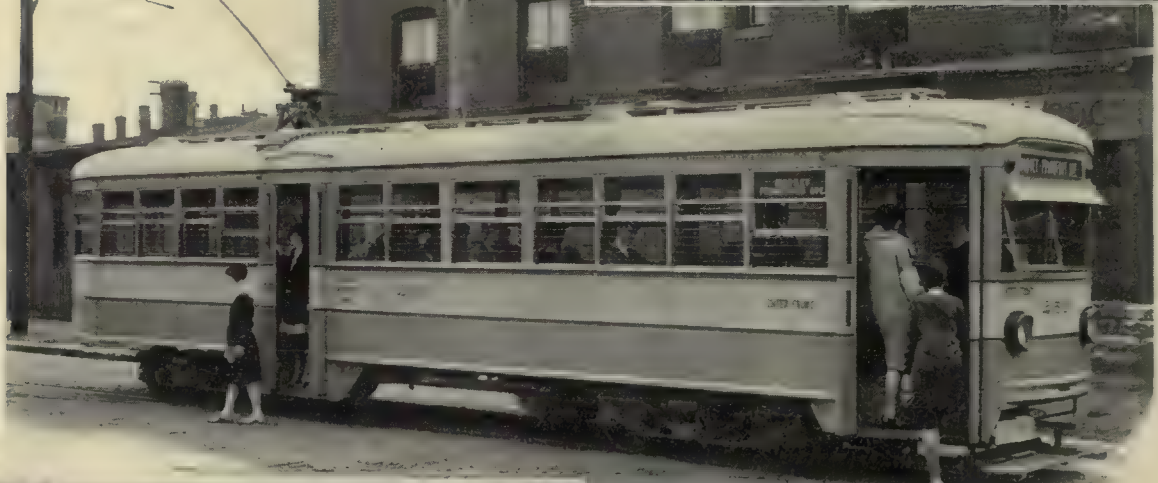
Meeting the Passengers' Demand for GREATER COMFORT *and* CONVENIENCE

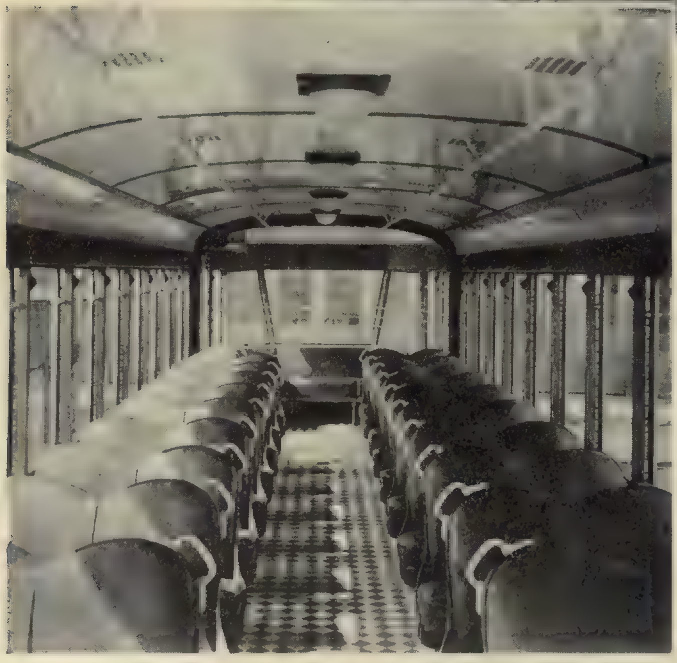
LONG STRIDES have been made in the last few years to provide greater comfort and convenience for passengers in the design, arrangement and equipment of electric railway cars. Heating, ventilation, lighting, seat design and trucks all have been improved to an encouraging extent in the general move of the industry to attract more patrons. Equipment engineers have made much progress, but are continuing to work on this big problem of the railways. They realize that many more changes in design must be effected to make the service even more attractive, comfortable and convenient to the rider, and more economical for the operator.

When the electric railway properties were first built, they filled a great need and were an indispensable part of the community in which they operated, being practically the only satisfactory means of local transportation. The city car made it possible for people to move out and live in less congested areas. The interurban, with its frequent headway and moderate speed, made it possible for people to go from town to town or farm to town in a short interval of time. In those days they performed a service far superior to any that existed and enjoyed a good patronage.

Many features to increase comfort and convenience are incorporated in the designs of the three Louisville sample cars







Top view—Two rows of dome lights, a reflecting ceiling and wide windows give ample artificial and natural light

In center—Automatic acceleration allows a high rate of starting without disturbing passengers

Bottom view—For the convenience of standees a wide aisle, projecting grab handles on the seats and horizontal stanchions are provided

The general introduction of the automobile, the bus and improved roads, however, brought very keen competition to the electric railway. Street and interurban cars of the old type lost their appeal to the public and many passengers adopted a newer form of transportation. The private automobile set a new and higher standard and the public rapidly showed their preference for vehicles with greater appeal. With these facts in mind the car equipment designers were faced with the problem of developing cars comparable or superior to the private vehicle. Their efforts to solve this problem have resulted in the development of many new cars, several including radical departures, and all showing a vast improvement in appearance and comfort over the older type. In the following paragraphs are listed many of the changes that have been incorporated in car design.

Heating—A new type of electric heater has been developed in which the heating element is entirely inclosed in a protecting steel sheath. This arrangement reduces the possibility of fire and electric flash which may occur when the open type element breaks with current on. A larger number of heaters have been installed on the newer type cars, many with full thermostatic control, thus giving a better distribution of the heat and a uniform regulation.

Many of the older interurban cars are heated with coal burning, hot water heaters with iron radiating

An extensive adoption of leather-upholstered, semi-individual cross seats for heavy city service was made in Chicago's 100 new cars

pipes along the sides of the car. The radiation of the heat has been greatly improved by the recent introduction of finned pipe. This finned pipe consists of ordinary iron pipe or steel tubing to which are attached vertical steel plates, thus greatly increasing the radiating surface. The biggest objection to the hot water type of heating cars has been its difficult regulation. Tests are being conducted at the present time on a hot water heater burning fuel oil with full thermostatic control. With this type of heater, combined with the finned pipe, it will be possible to obtain a close regulation of the car temperature. When the temperature reaches the upper setting of the thermostat the fire will be shut off and the finned pipe will quickly radiate the heat in the hot water. The introduction of fuel oil for the heater will eliminate the ash, dust and coal gas from the car interior and the necessity of having additional men during the winter months to tend the heaters.

Ventilation—The old deck sash type of ventilation has been replaced with automatic exhaust ventilators and in some cases with automatic intake ventilators. Tests are being conducted at the present time with forced ventilation. One system consists of a number of fans installed in ventilators in the roof; another

Many comfort and convenience features are found in the latest cars and buses of the Cincinnati Street Railway consists of a large exhaust fan mounted under the floor, connected to registers in the floor by means of a duct. With the automatic type of ventilator the amount of air exhausted depends principally upon the speed of the car and the direction and velocity of the wind. With the forced exhaust ventilation the amount of air exhausted is entirely independent of the external atmospheric conditions.

Seats—A great improvement has been made in car seats. The older type of cars were equipped with uncomfortable longitudinal or cross seats, some made of solid wood, others upholstered with carpet or hard rattan. The new cars are equipped with the greatest number of cross seats possible, and the design of these has been changed so that they are much more comfortable. The seats in these newer cars are upholstered with plush, leather or a good grade of imitation leather. The seat spacing also has been increased to allow more room for the knees of the passengers.

Lighting—The older type of cars were equipped with bare light bulbs and no fixtures. Lamps were of insufficient candle power and so few in number that there were only one or two foot candles at the reading plane. The new type cars are equipped with light fixtures, many of the dome type, and a sufficient number of high candle power lamps to give five or six foot candles at the reading plane. Too much emphasis cannot be placed on the necessity of good illumination, as a well illuminated car greatly adds to the convenience of the passenger and to the attractiveness of the car from the outside.

Acceleration—New types of control have been developed, one of which has a larger number of resistance setps and another of which has the feature of automatic acceleration. Both of these give a much smoother acceleration. By eliminating the jerky starting which accompanied the use of older types of controllers, the discomfort to the passengers from this source has been reduced.

Trucks—The design of trucks has been materially changed in an endeavor to improve riding qualities and reliability, and to reduce weight. While the older type trucks had rigid bolsters and stiff elliptic springs, the newer type trucks are equipped with swing bolsters, very flexible elliptic springs and coil springs. Many cars are also equipped with roller journal bearings to improve the riding qualities.

State Capitol of California at Sacramento, situated in a beautifully-landscaped park. The lower view shows the business section of Sacramento, with the State Buildings and grounds at the right

Use of safety devices on the cars has contributed in a large measure to the excellent safety record made in Atlanta

SAFETY DEVICES *Aid Materially in* Reducing Accidents

By

F. L. BUTLER
Vice-President
Georgia Power Company, Atlanta, Ga.

ANY PUBLIC utility company worthy of prospering is possessed of a conscience. It is this conscience which, if the company be a public carrier, recognizes the heavy moral responsibility of operating its cars, or vehicles, with the least possible hazard to the community it serves. This moral obligation is one reason for the increasing attention and study which has been given by electric railways in the past ten years to the reduction of accidents involving the public. An additional incentive to safe operation is the ever-increasing cost per claim to the company.

The often-used expression, "no accident is unavoidable," is probably true, but not from the standpoint of just one of the parties to it. Certainly many of the accidents involving the cars of a street railway are unavoidable as far as the company is concerned. Yet on the other hand, it must be admitted that the railways, even the best of them, have a long way to go before

Foot control and convenient, plainly-marked auxiliary control handles simplify the duties of the motorman and make operation safer

they have done all that they can and should do to eliminate the accidents which, through effort on their part, are avoidable.

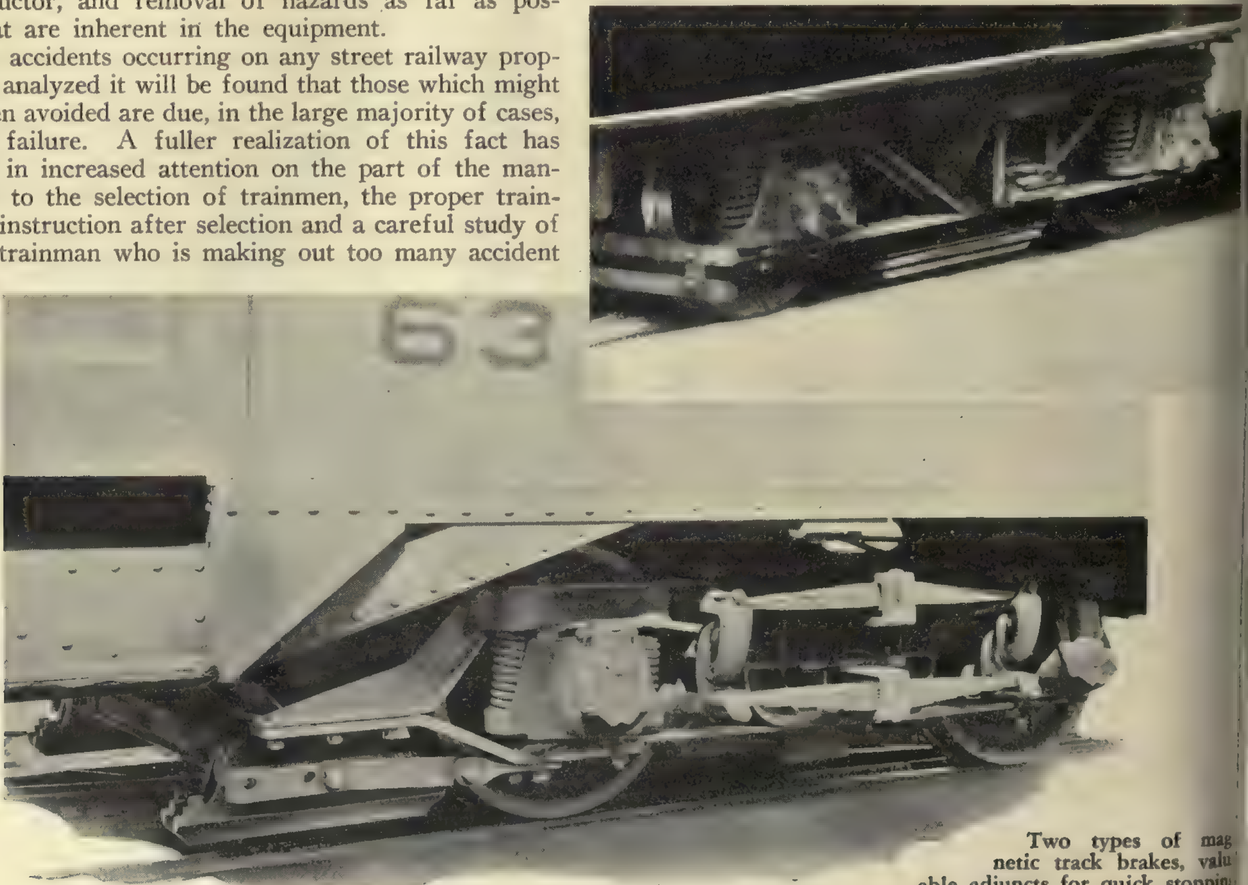
Activities pertaining to accident reduction divide naturally along two lines: reducing the number of cases of man failure on the part of the motorman, operator or conductor, and removal of hazards as far as possible that are inherent in the equipment.

If the accidents occurring on any street railway property are analyzed it will be found that those which might have been avoided are due, in the large majority of cases, to man failure. A fuller realization of this fact has resulted in increased attention on the part of the management to the selection of trainmen, the proper training and instruction after selection and a careful study of the old trainman who is making out too many accident reports. The greatest results can be obtained by upgrading the man who operates the equipment. However, much can be done to reduce those avoidable accidents which are charged to the equipment.

Taking the electric railways of this country as a group, it can be safely said that equipment is being more efficiently maintained than at any time in the history of the industry. This may be partly because of necessity, but it is in the interest of better service, as dependable service is better service. At the same time well maintained equipment is safer equipment and results in fewer accidents.

With the advent of the one-man car many new safety features and devices came into use and improved safety records have resulted. It is fundamental that divided responsibility creates a tendency to let the other fellow do the job with the result that, on cars operated by two men, accident hazards that either might avoid are overlooked by both. The one-man car puts the job directly and solely up to one man, as it should be.

To the public, ignorant of the many safety devices with which it is equipped, the one-man car does not appear as a step toward greater safety. A proper understanding of the equipment in use on the modern one-man car would clear up many misunderstandings on their part in regard to the safety of this type of car. In the industry itself there are also differences of opinion as to the value of various safety devices that have been designed and put on the market to assure the safe operation by one man of a street car through the busy streets of large cities. The question as to whether or not certain equipment should be installed on a car should not be decided from a standpoint of the first cost or maintenance cost. Executives and officials responsible for the operation of cars should realize their responsibility to the community



Two types of magnetic track brakes, valuable adjuncts for quick stoppin and see that every precaution is taken so that the operation of the cars will cause no undue hazard to pedestrians or other users of the streets.

Very often a car can be so burdened with safety apparatus that its operation not only becomes complicated but also the speed of the car is reduced. In an effort to make up lost time the operator may possibly have an accident that would not have occurred if his attention had been on the operation of his car rather than on maintaining his schedule. Simplified control is in itself a measure of safety.

In discussing the devices and methods in use on the modern car only a short outline of their purposes and their advantages and disadvantages will be given.

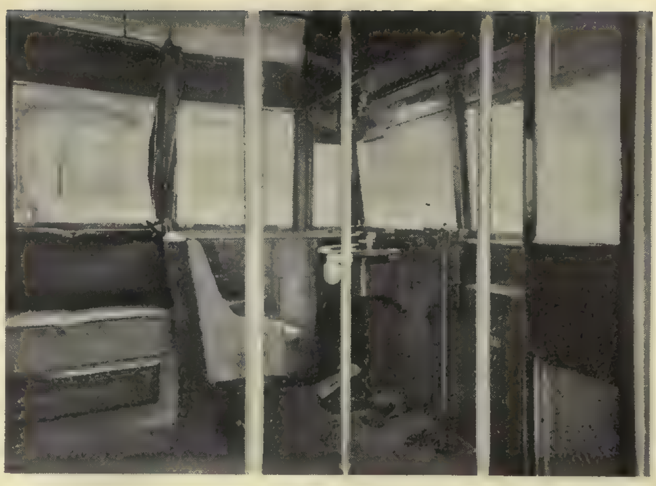
"Dead Man" Controller—The "dead man" feature of the controller handle which is so arranged that the handle is depressed against a slight upward spring pressure, has been the subject of considerable discussion among operators. Having had some cases, however, when operators have fallen dead at their controller and other cases when they have fainted or otherwise lost consciousness, this feature, in the opinion of the writer, is a very important adjunct to the one-man car. Certainly its use has enabled companies to introduce successfully the one-man car. Of course, the type of accidents it is designed to prevent are rare and may possibly never occur on a small system. However, if an accident should occur from this cause, the result might be so serious as to cause legislation against the use of one-man cars.

Magnetic Brakes—There is no discounting the value of the magnetic track brake, but the cost and the difficulty of application to a great many existing trucks has curtailed the use of this valuable adjunct for quick stopping. Certainly its value is increasing with the higher speeds of the modern car and the increased congestion in city streets. It has the advantage of being the only type of brake that is affected but little by rail conditions. It is not unlikely that this type of brake will receive a great deal of attention in the near future.

Dynamic Braking—The use of dynamic braking is not very extensive at present. Its use requires ample power and often, with larger motors, commutation troubles develop. As a safety factor its value is still questionable since its ability to stop the car is limited by wheel slippage.

Air Brakes—Operation of the conventional air brakes has recently been speeded up by the installation of quick-application and quick-release valves, and more recently by the coming into use of an improved "self-lapping" brake valve, which is designed so that cylinder brake pressure corresponds to brake-handle position. This valve should have a tendency to reduce lost motion in braking, due to the habit of some operators of "fanning" with the brake valve handle.

Passenger safety in boarding and alighting is increased by low step heights, step lights and properly-located stanchions



Mirrors, windshield wipers and wide vestibule windows aid the motorman in avoiding accidents

Window Guards—Window guards detract from the appearance of the outside of the car and also increase the difficulty of window cleaning. Nevertheless, it must be admitted that window guards serve to reduce the number of accidents, unless track centers are unusually wide.

Window Wipers—Certainly no one would drive an automobile these days without an automatic type of window wiper. Certain designs of window wipers for street cars are a great help during storms, and in cities where single-end cars are in use, the use of window wipers should be considered as essential. In cities with double-end equipment, however, it is difficult to keep them on the cars and to keep them in proper operating condition.

Motorman's Mirrors—Motorman's mirrors are located in two positions, one on the inside of the car and the other on the vestibule corner post outside. The purpose of the inside mirror is to enable the operator to see his passengers and also to get a vision of the rear door. To accomplish this purpose to the best advantage, the location of the inside mirror should be such that the reflected beam is over the heads of seated passengers on the right side of the car. If the mirror is located, as in general practice, so that the beam is reflected down the aisle of the car, a few standing passengers can defeat the purpose of the mirror.

The outside mirror is probably more effective in preventing step accidents, but in cities where automobile and truck drivers are not accustomed to projecting accessories it would be a difficult matter to keep them from being destroyed. Also, with loaded aisles or platforms, passengers standing on the platform between the rear end and the front end of the car would seriously interfere with the operator's seeing what is going on at the rear door.

Warning Signals—There is a need for a satisfactory electric gong which, up to this time, has not been developed. At present, the air-operated gong is probably the most used method of warning signal for city service. Eliminating the trouble from air leakage and freezing during the winter months, to which they are more or less susceptible, they are moderately successful for city use.

Interlocking Door With Brake and Controllers—A number of cars were brought out with rear door interlocking both with the controllers and the air brakes. This combination made it impossible for the operator to start the motors or to release the brakes until the rear door came almost to the closed position. This resulted in longer stops. Some companies have removed both the interlocking features; others have removed the brake interlocking device but have retained the electric interlock between the rear door and the controller. Both features have certain advantages in accident prevention work but evidently the disadvantages have been such as to convince certain operators that their use is not essential. On our property the brake interlocking has been dispensed with. However, the interlocking between the rear door and controller is considered an important feature and is still retained.

Air Compressors—Proper pressure of air in the reservoir is one of the essentials in safe operation. The present type of air compressor has generally proved reliable, but a reduction in weight and the elimination of the commutator end bearing would be desirable.

Variable Load Brakes—While variable load brakes have always had certain advantages, the introduction of the modern light-weight, high-capacity car has increased these advantages so that now we consider them a necessity.

Electro-pneumatic Door and Step Control—On one-man cars where the passengers board at the front and leave at center or rear exit doors, the electro-pneumatic door and step treadle are necessary features. The exit door should be connected with signal lamps in front. Some operators claim that signal lamps are more efficient, because the rear-door mirror distracts the motorman's attention from the front of the car and because they are not absolutely dependable. Similar criticism might be made of signal lamps as they may burn out. Their replacement, however, is simple.

The various requirements in different communities for a safe vehicle make it impracticable to lay down an arbitrary standard for which safety devices should be installed on the ideal car. All operators with the proper understanding of their responsibility to the community will equip their cars with all necessary safety features to meet the requirements on their property and will have their trainmen thoroughly instructed on the proper operation of their equipment. It should be borne in mind that the cost of a serious accident does not stop with the payment of claims, as accidents are given a great deal of newspaper publicity and discourage the use of the service so that the loss in revenue from one serious accident may go on for years. Whenever the problem is squarely met and fairly solved the return in accident prevention and in improved public relations will more than justify the cost of equipping the cars and the cost of an efficient instruction department.

MANY benefits are derived from the use of automatic control. Rapid progress is being made by the Sacramento Northern Railway in converting fifteen of its seventeen manually operated substations to automatic control. When the work is completed there will be a total of nineteen automatic and two manually operated stations having a capacity of 11,100 kw.-hr. In addition to this, the power company furnishes direct current to our lines from five of its substations at various locations. The voltage is more evenly distributed through automatic control, as the machines are governed by the power demand. Extremely satisfactory results thus far have been obtained from twelve stations which have been converted.

J. B. Rowray.
General Manager
Sacramento Northern Railway
Sacramento, Cal.

Speeding through a scenic valley near Mount Diablo in Contra Costa County—a three-car train of the Sacramento Northern Railway

By

CARL W. STOCKS
Editor
Bus Transportation

Developments in bus design have made this vehicle suitable for a wide variety of transportation uses

Improving the Bus to INCREASE ITS USEFULNESS

CONTINUED improvement in bus design is having a marked effect on the growth of bus use in connection with local electric railway operations. Bus designs are now available for a wide variety of traffic conditions found in city operation. Almost any seating capacity can be secured. The most popular sizes, however, are those with 21, 29, 33 or 40 seats, with some few operators still utilizing double deckers of even larger capacity.

The growing popularity of the bus is not surprising when the comparatively small investment necessary to furnish service and the ease with which credit can be obtained are considered. Nearly half the investment in an electric railway must be buried in the ground in the shape of tracks and paving, which have little or no value for any other purpose, while adequate bus operation can be furnished for approximately the same investment that would be required for the railway cars alone.

Nothing emphasizes this fact more than the rapid increase in the number of cities where rail and bus services have been closely co-ordinated. In the seven years ended Dec. 31, 1929, the number increased from 177 to 357; and in the first four months of the current year the number of cities has shown a further increase, although complete figures are not available to show the exact number.

During this period, the sphere of the bus has greatly changed. A new conception has arisen as to how buses can be economically used in connection with electric railways and as a co-ordinated part of a local transportation system. At first, buses were looked upon merely as potential feeders to existing rail lines, in order that the railway investment might be preserved without loss to security holders. But the patrons of these feeder routes failed to take kindly to the necessity of transfer from car to bus and it soon became apparent that unless through bus routes were operated into the business centers of the community, the traffic would not support the bus service. The bus service, instead of being profitable as was anticipated, incurred losses that could not be absorbed. Then followed the idea of changing the feeder bus lines to through bus routes, the gradual elimination of poorly patronized trolley lines, and the substitution of suitable capacity buses.

Buses are now being successfully used in a wide variety of ways for handling local traffic. The extreme flexibility of this easy riding, rubber tired transportation unit has demonstrated that it has many advantages both to the traveling public and to the transportation merchant. Instead of making extensions with track, buses have been used to develop new territory. Many single-track trolley routes have outgrown their usefulness and the bus is now giving better and more frequent service. Except where the volume of traffic to be handled can justify the investment for double-track railway lines, buses usually can perform with better results.

Larger capacity buses are one of the most important recent developments. For routes on which there is heavy passenger interchange, many are equipped with rear-exit doors

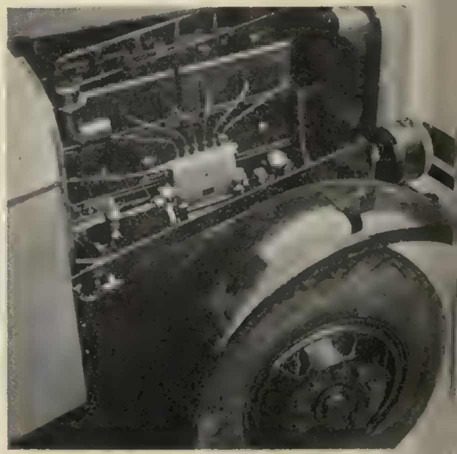
But what are the significant developments in design that have brought about this changed viewpoint toward the motor bus? From a transportation standpoint there is a bus for almost every traffic need and almost any seating capacity can be obtained. The more recent designs have adequate headroom to permit standees being carried without discomfort. For routes with extra heavy traffic or where there is considerable interchange of passengers en route, the body is fitted with a rear exit door. These doors are either manually operated by the driver or are treadle controlled and air operated. Interior illumination is better. Ventilation has been improved, although there is still opportunity for further development. The use of direct exhaust heating is gradually disappearing and in its place has come forced-draft hot air or hot water heating. Nevertheless, the obnoxious smell of burnt gases in the engine exhaust too often permeates the body interior. In cold weather it is especially noticeable with a following wind and in the warm weather it rolls in the open windows when the vehicle stops to pick up or discharge passengers. Even with the tail pipe at the rear this trouble still exists.

Nothwithstanding these defects, the bus is steadily growing more popular as a medium of transportation. It is fast; its acceleration is improving; and the time which is lost due to low acceleration is made up in smooth rapid braking, for the modern bus has a retardation with airbrakes of from 10 to 12 m.p.h.p.s. without excessive discomfort to passengers. This is far greater than is ordinarily obtained on steel rails.

From an engineering viewpoint developments in bus design have been extremely rapid. One design has followed another with such rapidity that style and mechanical obsolescence have become factors of considerable importance for the operator. Probably no other use of the gas engine has had to meet such rigorous demands. The same can be said of the clutch and gear set. Notwithstanding this, engines have increased steadily in size and horsepower to meet the demands of the transportation service for which they are intended. In fact, engines and body shell are competing for chassis space, even though wheelbase has grown from 198 to 265 in. In the larger capacity vehicles of conventional type, the engine now protrudes into the passenger compartment. Weight distribution has thus become a factor, not only in steering facility but in tire life. Whether or not six-wheelers will again come to the front is a question that remains unsettled.

Outstanding, perhaps, is the development of the power plant. Starting with four-cylinder engines of less than 300-cu.in. displacement and rated at substantially less than 50 hp., both the displacement and horsepower have been steadily increased. Today the four-cylinder engine has been

Six-cylinder Diesel bus engine used in experimental work by Public Service Co-ordinated Transport

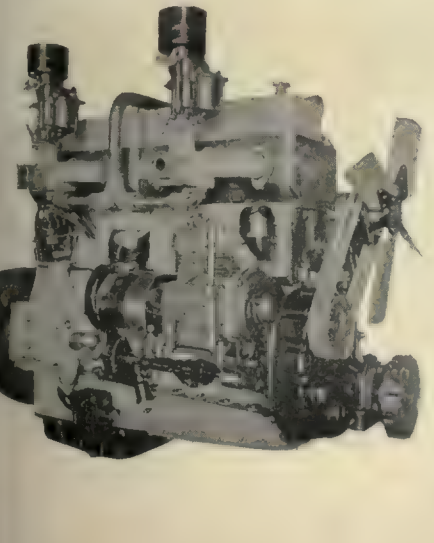


Recent types of small-capacity buses for city service

almost entirely supplanted by the six in order to meet the demand for better acceleration, faster schedules and smoother running, all of which are deemed necessary to compete with the ever increasing private automobile competition. In one instance a manufacturer has used dual engines. Engines found in the larger buses of conventional type have a displacement of from 450 to 600 and more cubic inches and a rated horsepower of 85 to 150. The rate of acceleration has likewise increased, though not in direct proportion to this greater displacement.

A word should be said with regard to the gas-electric type of drive. This unit has proved itself of value in cities where bus routes are operating in a larger measure through heavy vehicular traffic. In such places, the turn-over in passenger traffic is naturally heavy and often requires from twelve to fifteen stops per mile. Gear shifting under such conditions of operation is a severe strain on the driver and the varying rate of acceleration is annoying to passengers. It is in such service that the gas-electric unit has proved most satisfactory.

Recent designs of bus engines give greatly increased power. This is a six-cylinder 150-hp. type



Much progress has been made in the design of several of the important gas-electric bus units and the excess weight formerly found in chassis of this type has been materially reduced. Satisfaction with these units for city service is best demonstrated by the steadily increasing number of carriers using these vehicles.

Recent experiments conducted by Public Service Co-ordinated Transport, the largest single operator of gas-electric vehicles, with a six-cylinder Diesel bus engine to drive the generator should not go unmentioned. It is understood that other companies are exceedingly interested in this Diesel-electric combination and it is confidently expected that within the next year there will be several other installations in the eastern part of the country.

Next among major improvements comes that of the brakes. The manually operated type of brake has largely been superseded by some form of power brake for two reasons: first, to assure greater safety to passengers and to other highway users; and, second, to relieve the driver of considerable physical effort and resulting fatigue. Fabric linings and two-wheel brakes on the rear axle or a single brake on the propeller shaft have given way to the four-wheel type of power-operated brakes using some form of molded linings. Steel shoes were tried at one time but current practice leans heavily toward molded linings today. The use of these substitutes for fabric linings permits the use of higher braking pressures and consequently produces higher rates of retardation. These changes permit faster and safer operation in traffic lanes that are used by other vehicles fitted with four-wheel brakes and capable of stopping quickly.

So much for the chassis in general. With the continued demand for vehicles of even larger capacity and ability to carry the maximum number of standees, the manufacturers have been beset with the problem of furnishing deeper and heavier frames with more substantial cross members and body outriggers. For this reason, bodies have had to be built more substantially, thus causing unforeseen stresses to be set up between the frame and outriggers due to chassis weaving. The net result has been a battle between the chassis and the body. Instead of the frame holding up the body, the body at times holds up the frame until outriggers become distorted or broken, or the body gives way at its weakest point. It seems that there is yet much to be learned through experience as to body stresses. Whether existing designs or methods of mounting will be discarded is difficult to say at this time, but it is evident that something needs to be done that will permit the chassis to become the load-carrying unit under any and all road conditions. One manufacturer has developed a four-point system of attaching the body to the chassis frame in an effort to eliminate transferring the body stresses, due to weave, to the frame.

Notwithstanding that over-all weights are greater on a passenger-capacity or seat basis, much progress has been made toward more effective utilization of weight-saving materials. A great deal yet remains to be done, of course, and if fuel consumption is to be reduced, one way is through greater use of light-weight alloys for strength supporting members of both chassis and body. Analysis of weights on the basis of pounds per cubic inch of engine displacement also indicates that marked progress has been made.

In refinements and redesigning of unit parts to give longer service without increased attention many advances have been made. Bus engines now reflect the last word in power and performance. The sleeve-valve engine still holds its popularity for heavy-duty city service. For use in connection with electric motor driven units, the overhead-valve type engine is being more extensively used. Noiseless and more effective tappet features have been included in the valve mechanism of this type engine by one manufacturer. Other features of the modern engine are the use of steel-backed bearings for the crankshaft or the so-called chocolate bearing, both of which are intended to produce longer life and consequent lower maintenance costs. Alloy pistons, forced feed to all wearing parts, such as pins and rod bearings, oil filters and counterflow oil circulating systems, all are playing their part in reducing engine maintenance.

Nevertheless, as the engines have increased in size not all of the increased power has become available for direct propulsion purposes. Larger engines naturally require more power for auxiliaries. Fans are larger and their operation takes a proportionately greater amount of engine output. Water pumps and oil pumps are also of larger capacity. The same is true of lighting generators and air compressors. These all demand more power. Hence all the gain in effective horsepower can not be said to go to the driving wheels. Some of these power demands have been lowered through closer study of the operating characteristics of the auxiliary units. Oil cooling is another feature recently considered, but this practice is far from being universal in the design of all types of engines.

As has been noted, real progress has been accomplished in engine design. Speeds have been decreased for the maximum torque with the result that the lineal piston speeds have been held within reasonable lubricating bounds. Compression ratios have also been stepped up to permit the use of low grade fuels without too much loss in power.

Tire developments can not be overlooked. The progress made by the tire manufacturers in selling service by the mile has produced one bright spot in the expense accounts. Tire construction has been materially improved through the use of a greater number of plies and the mileage secured from these tires is far more than at any time heretofore. The development of the heavy-duty balloon type to meet the increased weights of buses and their greater passenger capacities has increased the comfort of bus riding. What was once considered a rough road has thus been smoothed out if proper air pressures are maintained in the tires. High-pressure tires are now almost unknown, except on the older types of buses, and tire costs under the mileage contract system have materially decreased within the past few years. The rate of 1.5 cents has decreased to 1 cent or less, even with service, a figure that is difficult to meet where tires are purchased outright and maintained by the carrier.

Success in bus operation is not accidental. It can be secured only by selection of the proper type and capacity vehicle, backed up by an adequate inspection and maintenance plan to give dependable and reliable schedules. Because no two systems are alike, because road conditions between different systems are not uniform, because traffic conditions vary, and because driver training is different on each property, there can never be a standard inspection and maintenance plan. True, the methods followed can be similar but the period between inspections and their thoroughness, whether based on vehicle-miles operated, on engine revolutions, on kilowatt-hours generated, or gasoline consumption, or any other unit, must be worked out independently for each separate operating system. Every property must of necessity experiment with inspection periods of varying duration until the one best suited for the property in particular is developed.

What the future will develop in the way of further requirements in design is difficult to foresee. It is evident, however, that closer attention has soon to be paid to decreasing the weights of chassis, body shell and accessories. One way can be through greater use of lightweight alloy metals; another through simplification of accessories and the elimination of devices and attachments that are not essential to passenger convenience. Close study of the weight problem is but one of the factors involved in profitable operation at the rates of fare now current in most cities. With operating costs varying directly with the number of vehicles required for peak load conditions, it is essential that proper selection of the vehicle be made and that rush hour vehicles be of larger capacity. In order that this may be done effectively, a careful analysis of route and vehicle costs must be made periodically. With operations properly conducted there is no reason to doubt the important part that bus operation will play in the future of local transportation.

The latest type cars of the Boston-Cambridge subway accelerate and decelerate at approximately 1.75 m.p.h.p.s. and have a free-running speed of 40 m.p.h.

Answering a GROWING NEED *for* Adequate Rapid Transit

By

EDWARD DANA

General Manager
Boston Elevated Railway, Boston, Mass.

AMID all of the confusion regarding the future methods of handling mass transportation in cities there is one conviction that stands out prominently. It is that the backbone of the transportation system in very large cities is bound to be rapid transit. The very conditions which are making surface transportation more and more difficult are correspondingly making rapid transit more and more necessary.

In testimony given last summer before the ways and means committee of the Massachusetts Legislature, I summed up the situation regarding rapid transit somewhat as follows:

"The need for adequate rapid transit has been accentuated in recent years by the increase in private motor-vehicle transportation. This type of transportation is most extravagant in the use of street space and has led to a condition of delay and waste time. Individual transportation by automobile will probably increase, but it should go hand in hand with adequate mass transportation facilities if the city is to prosper. The situation is illustrated by the following table, showing the relative capacities for delivering passengers for a maximum one hour in one direction:

Automobiles can transport (100-ft. streets, three lanes)	4,100
Buses can carry (maximum performance record on Fifth Avenue, New York)	7,300
Street cars	13,500
Two-track rapid transit	60,000
Express and local-track rapid transit	115,000"

In a few cities in the United States there are now sections where surface transportation is already out of the question. If skyscrapers continue in favor and automobiles are allowed freedom of the streets, in every very large city there will have to be rapid transit in the congested sections. This will extend as far out as economically possible, connecting with surface car lines and bus routes at the edge of the rapid transit district.

The doors on the new Cambridge cars are mounted on the outside rather than inside, and are electrically operated. The vertical white bands are the rubber door cushions

It is to be expected, of course, that there may be a reaction against excessive centralization of business. But this will not reduce the demand for rapid transit, because the new centers which must necessarily be developed will need rapid transportation connections.

Rapid transit is one phase of the solution of

Type of steel elevated car which has replaced a large number of wooden cars in Boston. It is equipped with one motor truck and has a running speed of 36 m.p.h.

the mass transportation problem about which it is impossible to generalize very much. Only the fundamental principles are applicable in all communities where rapid transit is feasible. Every large city has its individual characteristics which affect its rapid transit requirements and possibilities. In metropolitan Boston, for example, where the streets are narrow, crooked and hilly in the downtown section, the topography of the main business district is such that the effects of street congestion were early felt. Traffic flows, as it has for 300 years, from all directions into and out of the small peninsula which is historic and commercial Boston. Two-thirds of all the people entering this section use the "L." As I have stated before, Elevated transportation is the very life-blood upon which the industries and retail business of Boston depend.

Rapid transit in general, as illustrated in Boston, is undertaken primarily to save time for patrons. It is safe to say that the saving over even favorable surface line transportation is 50 per cent. Time saving in rapid transit results from obvious advantages, principally freedom from traffic interference, reasonably economical spacing of stops, and ability to use the types of rolling stock best adapted for speed.

On the rapid transit lines of the Boston Elevated System the demand for speed is met to this extent: over the 8.5 miles of main-line elevated route the running time is 30 minutes; the 4.1 miles route between Dudley Street and North Station (via Atlantic Avenue) is covered in 15 minutes; between Harvard Square and Ashmont (9 miles) the time is 25 minutes. The rush-hour headway on the main-line elevated and between Cambridge and Ashmont is two minutes, with a normal-hour headway of four minutes on the former line and 2½ minutes on the latter.

How the Running Time Is Kept Down

Speed of operation, aside from duration of stops, depends on running speed, rate of acceleration and rate of braking. Efforts of engineers are constantly being directed to increasing these quantities without exceeding cost limitations (first cost and maintenance) and without making riding uncomfortable for passengers.

In Boston we are using an accelerating rate of 1.75 m.p.h.p.s. in the Cambridge subway and East Boston tunnel with unloaded cars, and 1.5 with cars carrying seated load. The braking rate is 1.75 m.p.h.p.s. The elevated cars accelerate at 1.5 m.p.h.p.s., light, and at 1.3 m.p.h.p.s. with seated load. The braking rate is from 1.5 to 1.75 m.p.h.p.s. The free-running speed is 36 m.p.h. in the Cambridge subway and 40 m.p.h. on the same route in the open. The speed in the East Boston tunnel is 30.5 m.p.h. and that on the elevated is 36 m.p.h. These rates have proved adequate, but research is constantly in progress looking to possible improvement. We feel that quick pick-up and stopping are just as good sales points for mass transportation as they are for the automobile.

Recent type of Chicago Rapid Transit elevated car, using cross seats, an unusual practice for heavy service

The Rapid Transit Car Is the Crux of the Problem

While rapid transit has many other valuable features, an outstanding one is the possibility of designing a type of car that has large seating and standing capacity, high-

Train of Staten Island Rapid Transit cars which have two single end doors and a double-sliding center door on each side speed characteristics, quick pick-up and braking, etc. It will be of interest to consider some of the elements of modern rapid transit car design.

Of course, cars should be designed to present as pleasing an appearance as possible, although this feature may be complicated by some limiting condition in connection with window openings, letter boards or other governing considerations. During the past few years, street cars have been greatly improved in appearance. With rapid transit cars, however, there is not the same opportunity to vary the design aside, possibly, from the arrangement of doors, windows and roofs. Limiting conditions of tunnels usually definitely fix the car dimensions.

Steel cars for the Frankford Elevated in Philadelphia, using three doors on a side, each centered in its respective third of the car

The most practical arrangement of rapid transit car doors is one wherein the distance a passenger must walk, lengthwise of the car from the door opening to a point midway between the doors is the shortest possible and is equal throughout the length of car. This is accomplished by providing three doors in the side of the car. one at the center and two at points two-thirds the distance from the transverse center to the end of the car. With this arrangement a more uniformly distributed standing-passenger load is obtained. This, in turn, means a larger capacity than will result if the doors are arranged one at the center and one at each end of the car.

In the latter case the load is localized about the doors, with considerable available space in the area midway between them. This is true particularly in cars having longitudinal seats with a large standing area the full length of the car. Where a combination of cross and longitudinal seats is used, the condition is, perhaps, somewhat different. But even in this case, if the longitudinal seats are placed adjacent to the doors and the doors are located as in the first instance, the maximum standing load is obtained.

From the standpoint of handling the greatest number of passengers per unit, the longitudinal seating arrangement is superior to others. In the time required for loading and unloading of passengers, there also is a decided advantage in longitudinal seats in combination with the first door arrangement mentioned. The distance which it is necessary to travel to reach the door is shorter and there is freer movement of passengers due to the wide space between seats.

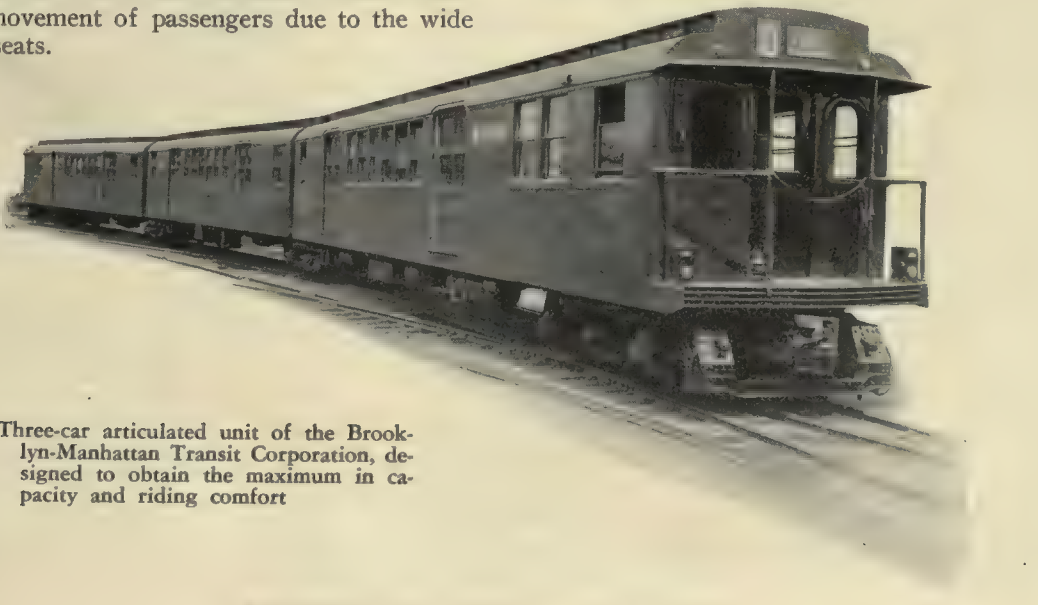
In rapid transit cars, floors of non-slip material should be provided, and door thresholds or other metal parts should be of such a design as to reduce to a minimum the possibility of passengers tripping or slipping. Sufficient stanchions, hand holds or grab handles should be provided to permit a passenger to support himself properly while the car is in motion.

On the question of seats, experts differ as to whether there is an advantage in providing soft upholstered seat cushions and backs, or whether some other seating material is better. In this matter I believe that for city rapid transit service, where the length of ride is comparatively short, leather upholstery is not desirable. Cushions and backs of wood slats, if of the proper contour, are perfectly comfortable and are preferable to leather from the standpoints of sanitation, durability and maintenance.

Provisions For Passenger Safety

It is the duty of everyone connected with car design to take all possible precautions against accidents to passengers and to operating men, including the shop men who maintain the equipment in first-class operating condition. To this end, doors should be provided with collapsible or rubber door bumpers which will permit a person to withdraw his arm or foot, in case he is caught in a closing door. Electric switches or apparatus of any kind which are involved in the operation of the car should be so located that passengers will not have access to them.

The question of weight of equipment is one which should receive careful consideration in the construction


Three-car articulated unit of the Brooklyn-Manhattan Transit Corporation, designed to obtain the maximum in capacity and riding comfort

of rapid transit cars. On the basis of a given operating cost per pound per year, it is obvious that the light car is more economical in operation than the heavy car. In addition to the saving in operating cost, there is a saving in first cost in body, trucks and motors. Weight, however, should not be reduced to the point of sacrificing the necessary strength for proper protection against collisions or other accidents. A substantial saving in weight can be effected in the design of any car without sacrificing strength by paying strict attention to the detail and design of small parts where the question of strength is not of great importance.

Boston's Latest Subway Car

In determining details of the present standard car for the Cambridge subway, of which 60 were recently commissioned, the considerations mentioned above governed the selection. The specifications have been published so that I need mention only the doors, which are in number three on a side and located as recommended above.

The doors on these cars are of wood, aluminum-covered, arranged to slide on the exterior of body and actuated by electric door operators. The result is light weight, and low original and maintenance cost. Moreover there are no door pockets, and no accumulation of snow experienced in the older type with pockets. The inside width of the car is greater than with inside-hung doors, and the unavoidable waste of compressed air with air-actuated door engines is eliminated, as well as the trouble experienced from freezing and slow door movement in cold weather. As compared with steel doors, these doors are approximately 640 lb. lighter per car.

The electric door operators are located under the seats, with a shaft extending through the side of car. To this is attached a lever for actuating the door. Operators are controlled from push-button groups at the end of the car, as on the earlier cars equipped with air operators. The end doors slide in pockets, but they are outside the gates, and weather stripping is provided to prevent snow from driving into pockets.

A Necessary Form of Mass Transportation

From my outline of the rapid transit problem, there is no doubt as to my belief in and enthusiasm for this form of mass transportation where feasible. Transportation patrons and prospective patrons want to save time. If convinced that they can do this they will limit the use of their automobiles to non-competitive service. Unnecessary time spent in going to and from business is just so much added to the day's work. It is particularly of the worker that I am thinking in this connection. He is usually compelled to travel in the rush hour when travel is at its worst as far as comfort is concerned. The less the duration of his homeward or workward ride, the less it fatigues him. Travel time saved for the patron is leisure time increased. Thus there is a sociological as well as an economic aspect to rapid transit.

The effect of rapid transit upon general living conditions has often been stressed. It cannot be over-emphasized. Rapid transit enables the worker to live at a reasonable distance from his work and under conditions of his own choosing. From the operating standpoint the high speed and the ability to use car and train units of large capacity offsets, under proper conditions, a large part of the increased capital investment involved in rapid transit. Thus densely settled urban communities of large population can have, and should have, rapid transit.

Above, aerial view of Fresno, agricultural and industrial city of the San Joaquin Valley, served by the Fresno Traction Company. At left, a waterfall in Kings River Canyon, a scenic spot near Fresno. At right, Fin Dome, a beautiful white granite mountain, on Rae Lake in the King River country

Portland, with majestic Mount Hood in the distance, an important trading center for a large area

Fifth Street, in the heart of Portland's retail district

IN order of their importance, successful commutation service must include (1) trains on time, and (2) adequate lighting and heating. The maintenance of train schedules is extremely important to the commuter who must be at his place of employment or business at a definite time each day. Because he uses his time on the train for reading his newspaper or magazine, the commuter must be provided with adequate illumination. Similarly, because he spends time on trains when otherwise he would be in his home, good heating and ventilation, comparable to that in his home, must be provided. EDWARD H. MAGGARD

President and General Manager
Northwestern Pacific Railroad
San Francisco, Cal

Shelters at Kentfield, along the route of the Northwestern Pacific Railroad

Attractive architecture adopted for the passenger stations of the Northwestern Pacific Railroad

The "Wally Briggs' Swimming Hole" at Electric Park, where the main power plant of the Grays Harbor Railway & Light Company is located. The pool was established by the company's late general manager.

Pine automatic substation of the Northwestern Pacific

Seattle, metropolis of the Pacific Northwest and a seaport with an immense volume of commerce

Typical stretch of Oregon Electric Railway track through the Willamette Valley between Portland and Eugene

Train of the Oregon Electric Railway, carrying an observation parlor car

An extensive bus system is operated by the North Coast Transportation Company, subsidiary of the Puget Sound Power & Light Company

Underwood & Underwood Photo

In the business center of Tacoma where the leading industry is the manufacture of lumber

A bit of old Vancouver—Cordova Street

Vancouver Hotel, in the commercial center of British Columbia

Modern cars of the British Columbia Electric Railway on Hastings Street, East, Vancouver

Below — Empress Hotel and part of Inner Harbor in Victoria, also served by the British Columbia Electric Railway. Olympic Mountains in the background

Below—The Provincial Parliament buildings at Victoria are among the most stately governmental edifices in North America

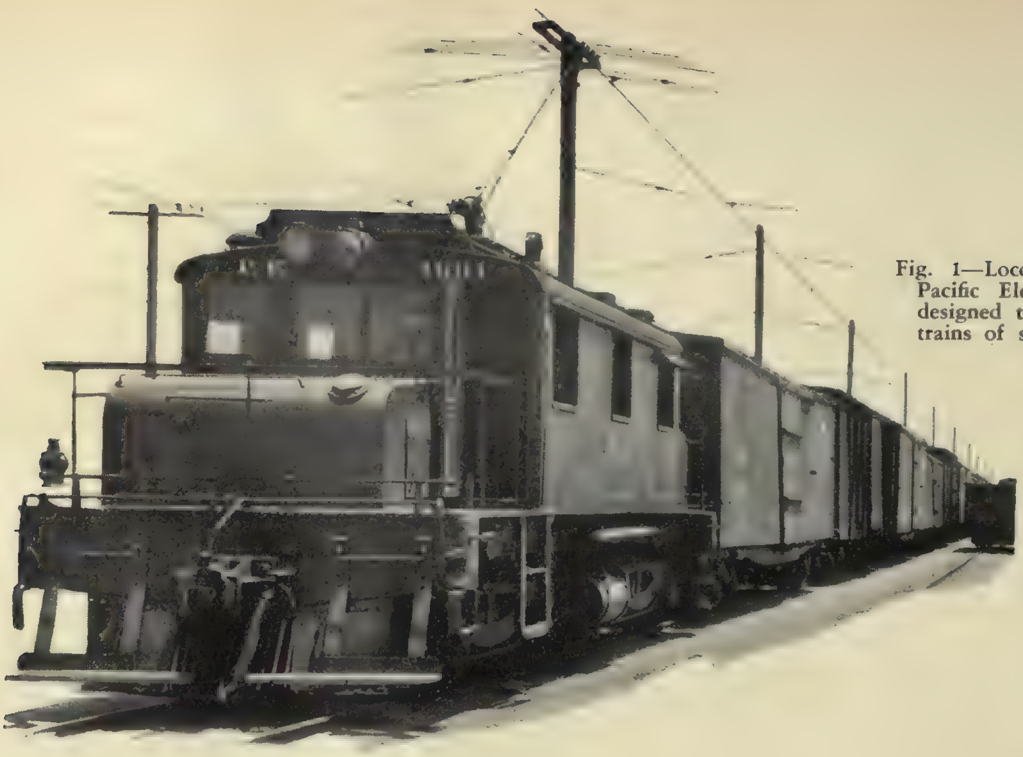


Fig. 1—Locomotive of the Pacific Electric Railway, designed to handle heavy trains of steam road cars

Recent Freight Equipment Tren

MORE PROFITABL

By

DAVID R. THOMAS

President Electric Railways Freight Company
Cleveland, Ohio

ELECTRIC railways engaged in the transportation of freight have changed their concept of this business and their methods of handling shipments very fundamentally in the past few years. A steady decline of passenger revenue and a new but powerful competitor, the motor truck, have caused them to take every progressive step possible to attract an increasing amount of profitable freight revenue. Definite policies, adopted for this purpose, are clearly indicated by the types of equipment placed in the freight service of the interurban railways during the past year. They show pronounced trends, on the part of these common carriers, toward:

1. Maintaining faster freight train schedules and using cars of greater capacity.
2. Providing facilities for handling steam road cars on electric railway lines and for moving electric railway freight cars over terminal tracks of steam roads.
3. Rendering pick-up and delivery, door-to-door service.
4. Affording container service.
5. Operating truck lines as feeders to rail lines.
6. Paralleling rail lines with truck lines to meet the competition of competing truck lines.
7. Using mechanical equipment for handling freight at terminals and instituting more efficient warehouse and loading methods.
8. Providing automatic accounting machines with which to reduce accounting expense and provide more comprehensive statistical information.

The accompanying illustrations indicate clearly the complete and comprehensive freight service that is the ultimate goal of the electric railways. Fig. 2, for example, shows the trend in equipment toward faster, better-appearing freight motor cars. Greater capacity, too, is being attained in both motor cars and trailers.

The effort on the part of interurban lines, as distinguished from electrified steam lines, to develop connections with steam roads is also evident. Interurban lines cannot handle steam road cars through city streets but they are endeavoring to utilize sections of their systems located on private rights-of-way for this purpose. Several roads have tentative plans to build around a number of the smaller cities to permit a more extensive use of M.C.B. equipment. During the past year, too, arrangements have been worked out whereby steam lines may handle interurban freight motor and box cars through steam road terminal yards. Only slight modifications in the construction of interurban cars were required to permit this operation.

In Figs. 4-8 are shown the different types of truck and trailer units used in electric railway pick-up and delivery service. The 1-ton tractor and 14-ft. semi-trailer, Fig. 4, is an extremely flexible unit and, with the second trailer to be left at the customer's premises while unloading the first at the freight terminal, is capable of picking up and delivering a surprisingly large amount of freight. The units shown, under favorable conditions, handle from 40,000 to 50,000 lb. of freight per day. The 2½-ton tractor and 20-ft. semi-trailer, Fig. 6, is the type of equipment used for large shipments by the Elway Transit Company, a forwarding company in Cleveland.

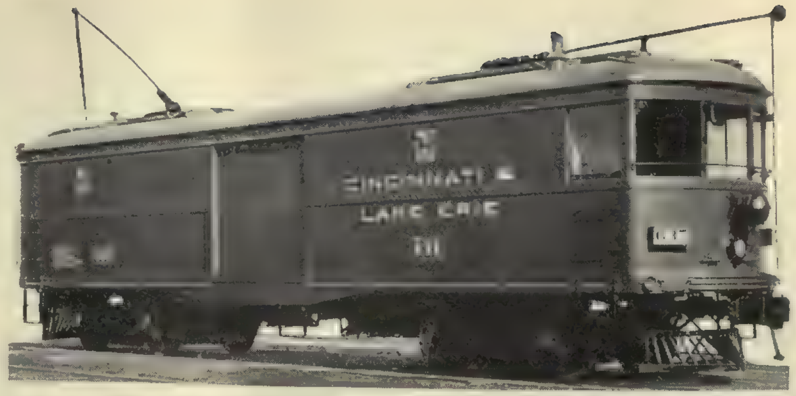


Fig. 2—Latest design of freight car, with a capacity of 80,000 lb., placed in service by the Cincinnati & Lake Erie Railroad. It is equipped with four 100-hp. motors and is capable of hauling twelve electric railway box car trailers at a speed of 45 m.p.h.

The truck carrying a Fitch container, Fig. 7, illustrates the flexibility of this container system. Note the similarity between this unit and any closed-body truck. The container may be carried on a highway trailer as well as upon a truck and is transferable to a railway flat car.

ssure a USINESS

For the most efficient pick-up and delivery service in the larger cities the equipment required may be roughly grouped into three classes:

1. One-ton tractors, each with two 14-ft. semi-trailers for light work.

2. Two-ton trucks for serving customers so located as o necessitate driving through narrow alleys and for using congested dock facilities. Half of the trucks should be quipped with closed bodies, the other half with stake odies.

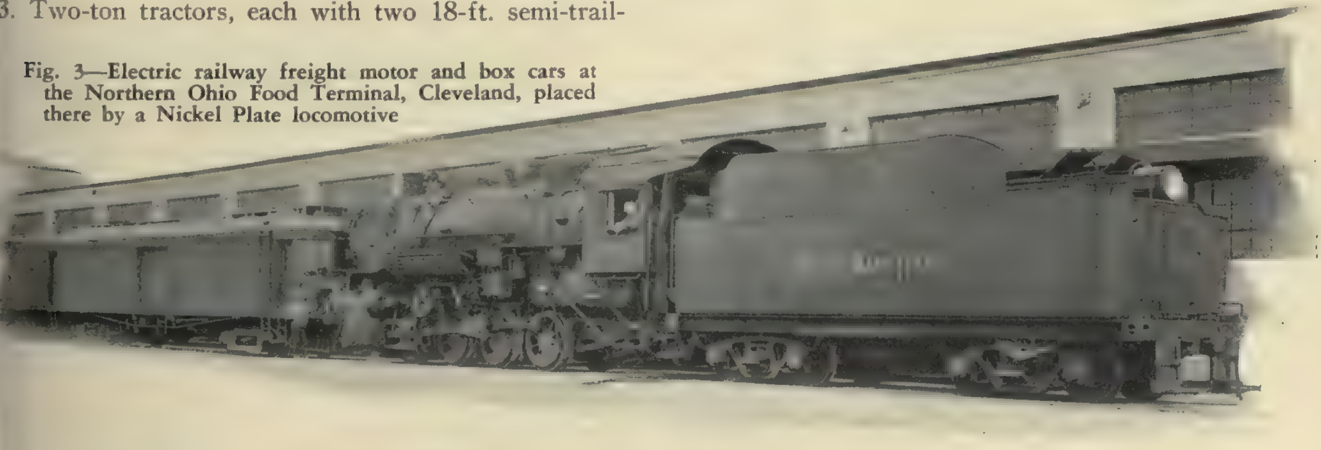
3. Two-ton tractors, each with two 18-ft. semi-trailers; one with stake body, the other with closed body. It will be found that the manufacturers of certain commodities insist upon their merchandise being handled in waterproof vehicles. It is difficult to maneuver trailers that are longer than 18 ft. in many localities.

For service in outlying districts the use of two trailers in train drawn by one tractor is found to be most efficient; the second trailer is converted into a four-wheel trailer by means of a dolly. This same equipment is used in handling tonnage between off-line substations and the rail head.

It is becoming more and more evident that freight service from the door of the shipper to the door of the consignee is to become the general policy of the electric railways. This policy is manifested in varying degrees throughout the country. In Western Ohio and Indiana the railways have gone only so far as to absorb from 3 to 5 cents of the shipper's or consignee's cartage cost on shipments conforming to certain specified minimum weights, and commodity classifications. The shippers and consignees provide the cartage equipment.

In Southern California the Pacific Electric Railway has provided for a complete pick-up and delivery service through the incorporation of the Pacific Electric Motor Transport Company. This company was organized for the purpose of carrying on the business of transporting freight, express and other commodities and of conducting a general receiving, forwarding and warehouse business. The rates of the transport company will cover the complete door-to-door service, or service from the shipper's door to destination rail terminal, or from originating rail terminal to door of the consignee. In the Pacific Electric Railway territory, shipments will be

Fig. 3—Electric railway freight motor and box cars at the Northern Ohio Food Terminal, Cleveland, placed there by a Nickel Plate locomotive



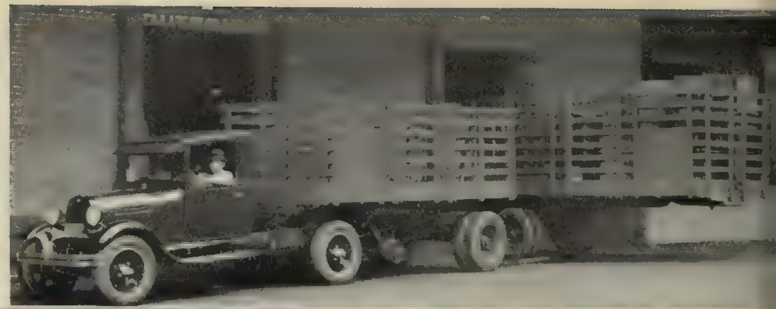


Fig. 4 (at right)—One-ton tractor and 14-ft. semi-trailer of the Electric Railways Freight Company for pick-up and delivery service

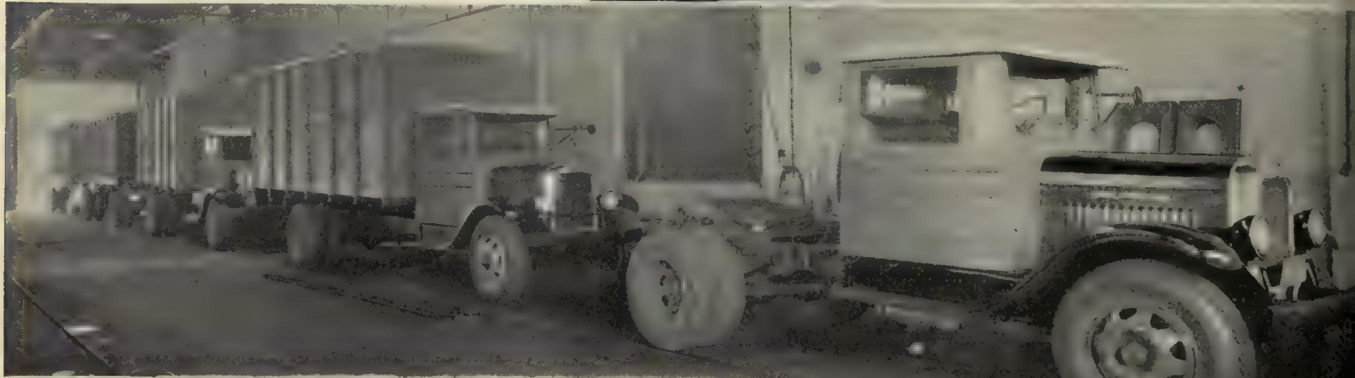


Fig. 5 (below)—Tractor, semi-trailer and four-wheel trailer equipment of the Northern Ohio Power & Light Company. The truck with container body is used for both highway and pick-up and delivery service

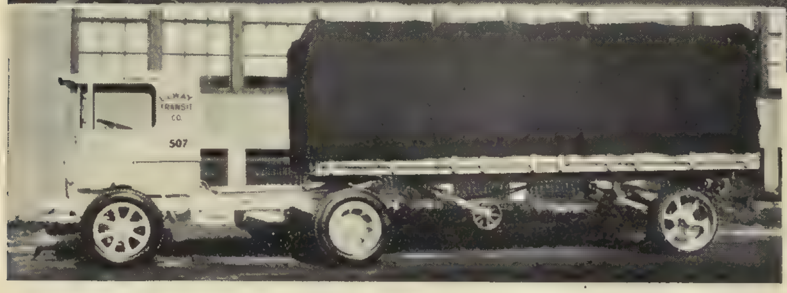


Fig. 6—Two and one-half ton tractor and 20-ft. semi-trailer used in pick-up and delivery service of the Elway Transit Company, a forwarding company in Cleveland

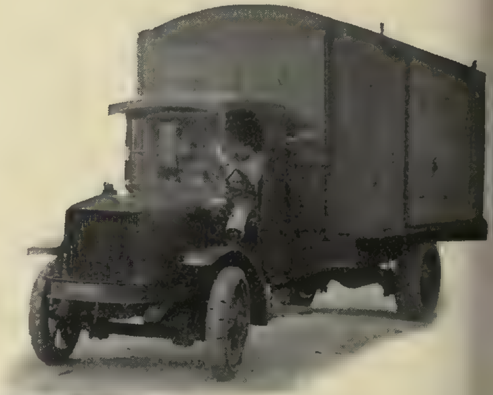


Fig. 7—Fitch containe-mounted on truck fo pick-up and delivery It also may be carrie on a railway flat car

handled over the rail lines, the trucks performing the terminal cartage service only. The transport company's door-to-door rate, in general, exceeds the terminal-to-terminal rail rate but no fixed charge is specifically added to the rail rate to defray pick-up and delivery costs.

In the Detroit district, the Eastern Michigan Railways controls and operates a local cartage company, but does not perform a free pick-up and delivery service. For points in eastern, northern and central Ohio, the Electric Railways Freight Company provides free pick-up and delivery service for single shipments of first, second and third-class commodities weighing 6,000 lb. or more, and on fourth-class commodities weighing 10,000 lb. or more. The carload forwarding companies utilizing the electric lines in Ohio and eastern Michigan afford a form of pick-up and delivery service with lower minimums than those jus described.

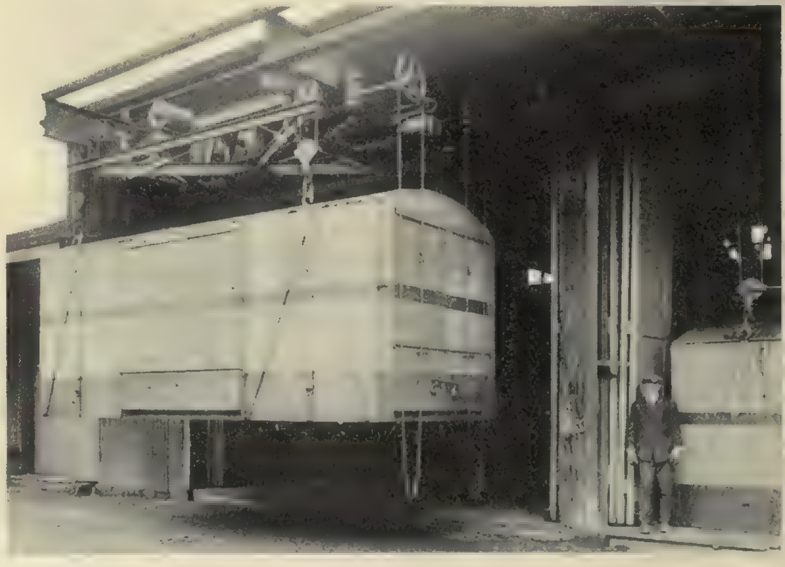


Fig. 8—Method of handling a Fitch container with an overhead crane

Pick-up and delivery service introduce a new element of expense to the railway that must be offset b increased revenue derived from additiona business, by more efficient handling methods, or by makin a charge for the additional service rendered. Comparativel

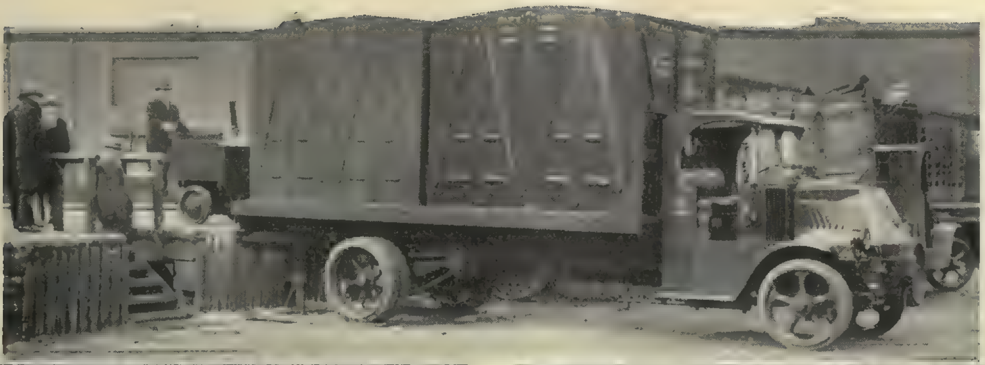


Fig. 9—Using an electric - lift truck to handle L.C.L. Corporation containers

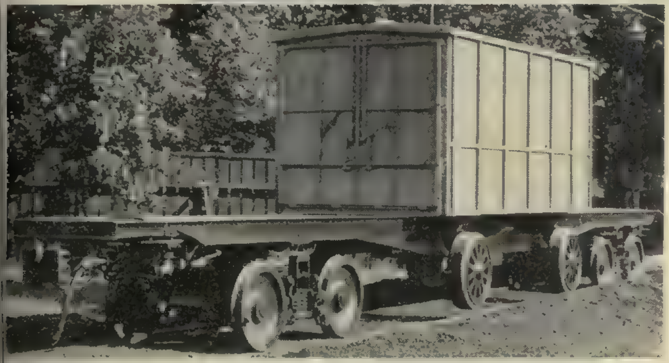


Fig. 10—Trailer of Bonner Railwagon system mounted on railway flat car

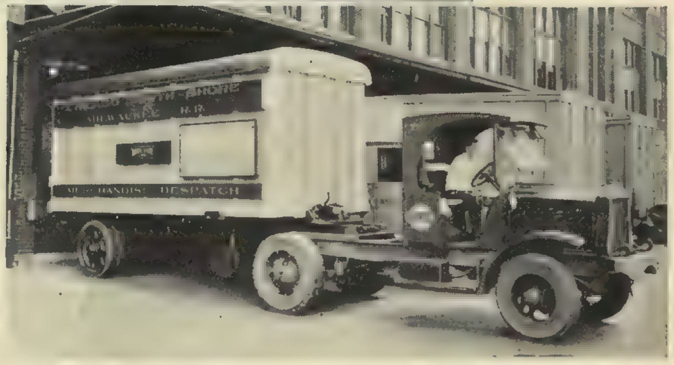


Fig. 11—Type of semi-trailer used by the Chicago, North Shore & Milwaukee Railroad

large shipments moving from one consignor to one consignee, or to several consignees at one destination, and shipments that, if not rehandled at terminals, can be shipped uncrated or unwrapped, are particularly adapted to motor-truck-trailer transportation. The use of containers eliminates 90 per cent of the terminal cost and from 50 to 60 per cent of the pick-up and delivery expense. The container also is, in a measure, a substitute for the steam road side-track, and makes available to the electric railways certain classes of steam road carload business that is not now obtainable because of the handling cost at electric railway terminals.

Figs. 8-11 show the trend of container design. It will be noted that the containers may be divided into two general groups: first, the demountable box type, illustrated in Figs. 8 and 9; and second, the highway trailer type, Figs. 10 and 11.

The box or container of the highway trailer type is in fact a highway semi-trailer that is carried, with wheels ntact, upon the railway flat cars. In the Bonner type, Fig. 10, the floor of the container rests upon the platform of the flat car with the wheels suspended on either side of the flat car, below the level of the car platform. The ournals of the flat car are placed inside of the car wheels instead of outside, the wheels of the trailer-container occupying the space customarily occupied by the rail car journal boxes, thus maintaining the over-all width of the standard interurban cars. In the case of the units used by the Chicago, North Shore & Milwaukee Railroad, Fig. 11, the trailer-container rides on top of the railway flat car, the wheels of the container resting on the car platform.

In both types described, three trailer-containers, each approximately 18 ft. long, may be carried on one railway flat car. The carrying capacity of each container is 20,000 lb. which permits a pay carload of 60,000 lb.

Several types of demountable containers are now available to the electric railways. The several methods of transferring them from truck to railway car and vice versa include the hoist, electric-lift truck and roll-off. It will be noted that the Fitch container, Fig. 8, is approximately twice the length of the other types of box containers shown. It is 18 ft. long and corresponds to the closed body of a highway truck, the bodies of the containers used by the North Shore, and those of the Bonner system. Three of these containers can be carried on a railway flat car, returning a very favorable per car-mile revenue at a comparatively low container rate. The

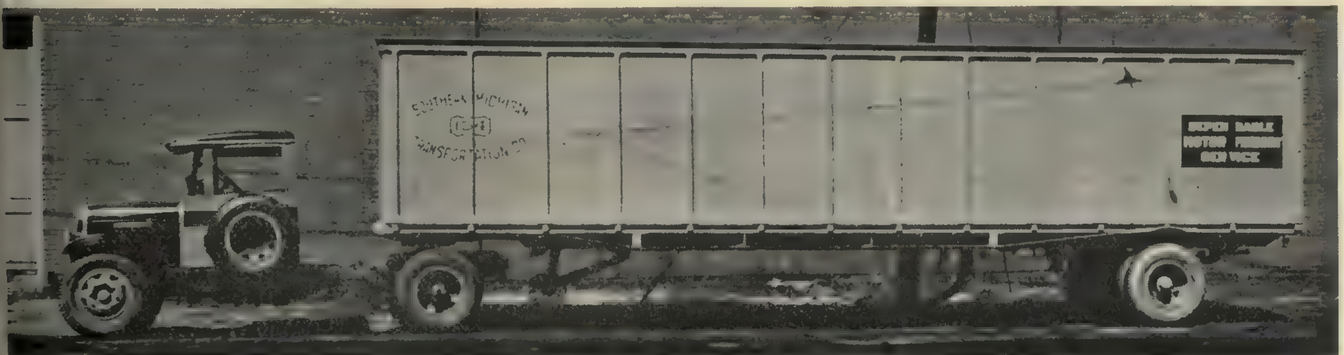


Fig. 12—Thirty-five foot semi-trailer unit of the Southern Michigan Transportation Company, used for hauling light and bulky freight

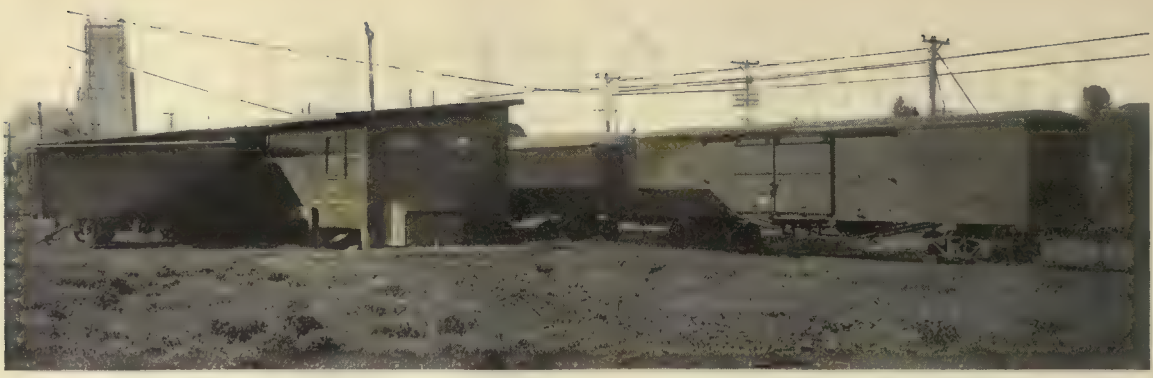


Fig. 13—Railway truck line transfer station of the Lake Shore Electric Railway, Toledo, with a "spot" capacity of four cars

18-ft. container is particularly adapted to meet the competition of the motor freight companies and is an excellent unit to use in connection with feeder truck lines. As a pick-up and delivery unit, the 18-ft. demountable container offers the means of meeting the competition of the side-track facilities of the steam roads.

Several types of highway equipment are now used by the electric railway freight truck lines. Power units usually consist of 2½ to 3½-ton tractors weighing approximately 7,000 lb. and capable of handling two trailers in train. The trailers are 20 ft. long and either of the stake or closed-body type; the second trailer in the train is either a four-wheel unit or a semi-trailer converted into a four-wheeler by means of a dolly. The trailers weigh from 7,000 to 7,800 lb. and have a rated carrying capacity of 7 tons but are capable of carrying from 10 to 12 tons. Fig. 12 illustrates a 35-ft. semi-trailer designed to handle bulky freight such as furniture. Several of these units are in the service of the Southern Michigan Transportation Company, Jackson, Mich.

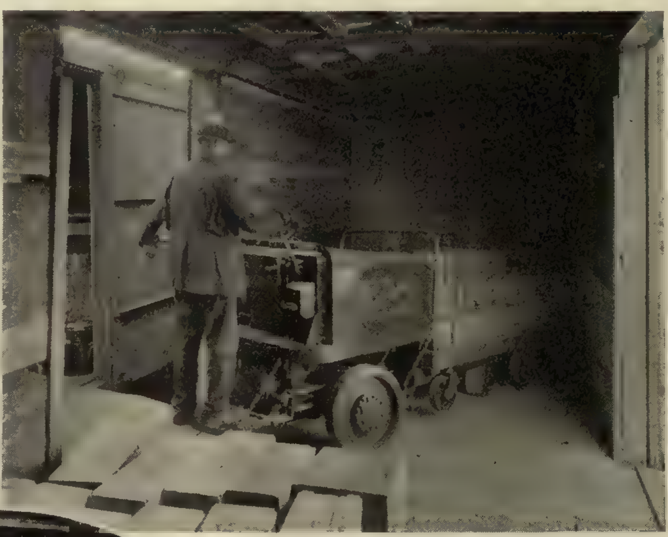


Fig. 14 — Elwell-Parker electric lift truck depositing skid in freight car

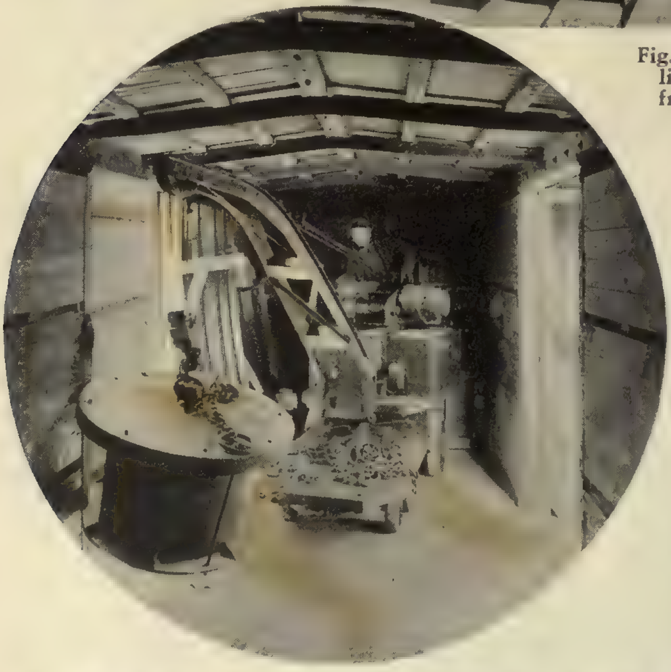


Fig. 15—Placing a heavy shipment in a car with an Elwell-Parker warehouse crane

Fig. 13 shows the Glendale rail-truck transfer terminal of the Lake Shore Electric Railway, located at the eastern city limits of Toledo, Ohio. This transfer has a "spot" capacity of four railway cars and has done much to eliminate congestion at the Toledo freight terminal. Cars loaded and unloaded at this terminal do not pass over the streets of the city.

During the past twelve months, a number of electric railways have either acquired truck lines or have entered into traffic arrangements with separately owned motor freight companies. In several instances, too, electric railways have abandoned rail operations and are serving the territory with motor trucks. The Eastern Michigan System, with truck lines radiating out of Detroit, is an example of an organization that is operating motor trucks as feeders to their rail lines, as developers of new territory not served by electric railways, as substitutes for rail lines that have been discontinued and as supplements to existing rail service. The Southern Michigan Transportation Company is giving freight service by motor truck, having abandoned all of its interurban lines.

In eastern, central and northern Ohio the Electric Railways Freight Company is directing operations of several truck lines that were recently acquired by the Northern Ohio Power & Light Company. These lines are being operated as feeders to the railways and for the purpose of meeting the competition of other truck lines serving the railway territory. The opinion is held by a number of operators that the railway which renders container service with the truck-body type of container will not find it necessary to parallel its rail lines with trucks.

In Figs. 14 and 15 are shown mechanical aids for reducing terminal costs and improving service. The advantages of these are self-evident.

Building BETTER *Track*

By

W. W. WYSOR

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United Railways & Electric Company
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President
American Electric Railway Engineering Association

Tee rail has recently regained a considerable amount of its former popularity for use in street railway track with concrete paving

IT IS a far cry from the days of the rumbling stage coach bumping over cobblestone streets to the comfortable and speedy electric railway service of the present day. While the improvements which have been made in the design of the vehicle have attracted the largest amount of public attention, the advances made in the design and construction of roadway have been equally important in improving the quality of service. Today all forms of transportation are judged by the standards set up by the rubber-tired automobile and its attendant comfort. It is of the utmost importance, therefore, that the electric street car be provided with the smoothest and best type of roadbed that engineering skill can produce. To meet this need, numerous changes have been made in design and construction during recent years.

Development of improved rails has been one of the primary factors in the improvement of track construction. Very early in the growth of our cities it became apparent that some more adequate form of public transportation was needed than could be supplied by free-wheeled vehicles. The first street railway was built in New York in 1832 and others the following decade. Boston began the construction of horse car lines in 1856, Philadelphia in 1857 and New Orleans in 1861 and other cities soon after. These were followed by cable lines, the first being built in San Francisco in 1873. Electricity began to be adopted as a source of motive power about 1888. By the time street railways came into general use, the tee rail had been developed as the type most suitable for

Grooved girder rail on wood ties is widely used in track construction

Combination steel and wood ties are used by numerous railways

A recent development in track construction is the use of bent steel ties

Experimental track built on rail seats without ties

steam railroads. At that period, however, the rails were all of light section, probably not over 4 in. high. This was found unsuitable for paved streets where deep block pavements were generally used, and the so-called tram rail was developed with a greater height and a horizontal lip to accommodate wagon wheels.

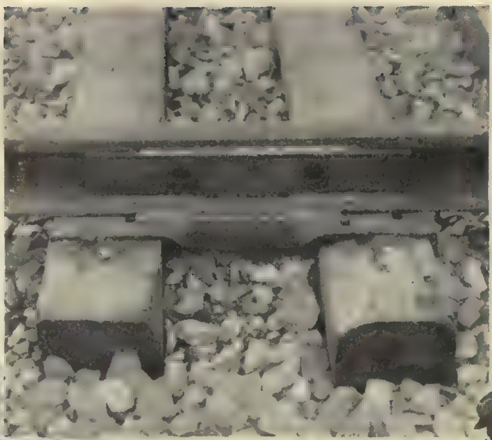
With the coming of the cable car and the electric car, speeds were increased as well as the frequency of service. This made it undesirable for free-wheeled vehicles to use the car tracks. At the same time smoother pavements were coming into extensive use so that there was not the same necessity for vehicles to follow the car tracks that had existed in the early days. The next development after the tram girder rail was a grooved type of rail known as the "Trilby" because the head portion of the rail when inverted resembled somewhat the Trilby type of lady's shoe then in vogue. The Trilby type of groove has since been modified to a groove which gives a better clearance for wheel flanges.

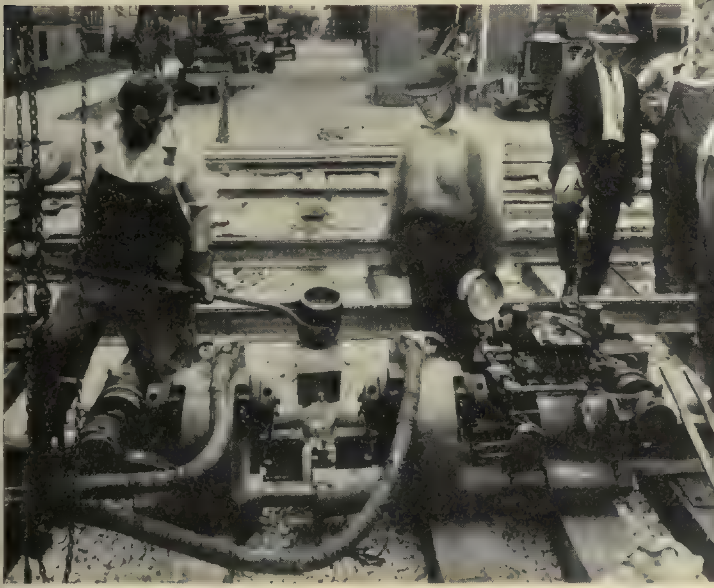
While there are a number of different grooved girder sections being rolled today, the one most commonly used is that adopted several years ago by the American Electric Railway Engineering Association as standard. This is made in sections either 7 in. or 9 in. deep. With the increasing use of concrete paving, however, the use of a tee section has regained a considerable measure of popularity. Several types of plain girder or tee rails have been adopted as standard by the A.E.R.E.A. There is also available a rail, first rolled for the Cleveland Railway, which is non-symmetrical in gage, the backside of the head being sloped in a manner similar to the head of the girder grooved rails so as to make a better job in paved streets.

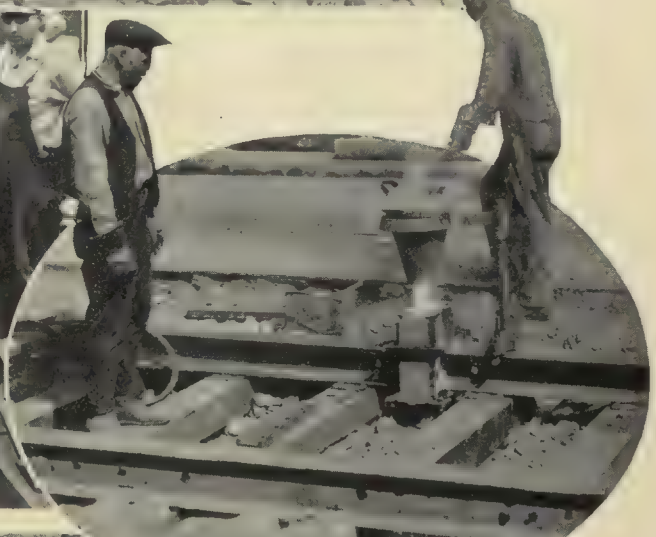
In general there has been a trend toward the use of heavier rail. Heavy rail gives track a longer life not only because there is more metal to resist wear but because it spreads out the loads and due to its anvil-like action absorbs the shocks, thus protecting the balance of the track structure as well as the surrounding pavement.

The increasing of wheel loads, car speeds, volume of traffic and also heavy motor trucks has resulted in the building of more substantial track foundations. While wood ties continue to be used more extensively than any other type, steel ties and combination designs have many adherents. Many companies have also adopted concrete in the track foundation, especially where steel or combination ties are used. To obtain greater density and closer union between the concrete, ties and rails, a number of railways have adopted the practice of vibrating the concrete thoroughly before it sets. This is not a new idea but new machinery for doing the vibrating has recently been developed.

One feature of track construction that has probably caused more concern than any other is the method of joining rails together. In the old days the street railways followed the steam railroad practice of using fish plates, and the various modifications including base plates and so-called continuous plates. However, on account of the difficulty in getting at joints buried in street paving, the troubles of the street maintenance-of-way man were intensified over that of his steam railroad brother when it came to maintaining joints. While the paving around street railway tracks is the source of a great deal of annoyance and expense, it does make feasible the practice of welding of rail joints. Thus we now have indefinite lengths of track, welded solidly so that it is, in effect, one continuous rail. The paving not only tends

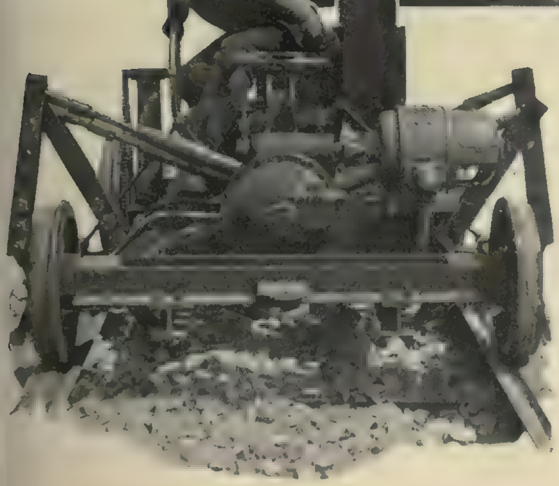

Typical electric seam welded rail joint


Making an electric butt weld


Thermit welded joints are widely used

Vibrating track concrete to give added strength

Reciprocal rail grinder mounted on car


Automatic ballast tamping is a recent development

Plastic rail filler helps to prevent transmission of vibration between rail and pavement

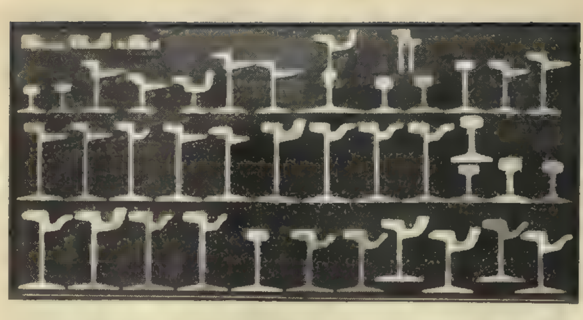
to keep down the extreme changes in temperature but confines the rail in such a way that it cannot buckle out of line and the stresses set up in the rails due to temperature changes are under the elastic limit of the rail steel.

The first method of welding rails together was by means of cast iron binding. There was, however, little actual weld in this case, the iron binding acting more through its gripping effect than through any actual fusion with the rail. Nevertheless, these cast-iron welds were remarkably successful. These gave way to the electric bar weld, the Thermit weld, the electric butt weld and the electric seam weld. Practically all the street railway track that is laid today is welded by one or the other of these processes, all of them being efficient but each having its own advocates and special applications. The welding of joints has prolonged the life of rails so that they can be used until worn down throughout their length instead of being scrapped when worn out at the joints.

In addition to joint welding, extensive use has been made of arc welding for building up worn spots in track. This welding can be done at a nominal cost and it has resulted in the saving of large sums of money.

Many improvements have been made in recent years in the design of special trackwork. When street railways first came into use, it was soon found that the switches used by steam railroads were not suitable for paved streets and what is known as the tongue switch was developed. This was a more or less crude affair at the start, as was also the other special trackwork. Frogs were either made by bolting together plain rails and cutting notches for the wheel flanges, or were made of cast iron. The sharp curves necessary in negotiating street corners were guarded with strap steel or specially rolled light guard sections secured to the running rails by bolts. These answered the purpose for a time but much difficulty was had in keeping these guards securely fastened and so there was developed a form of girder rail having a solid guard. This is a tremendous improvement over rail with a bolted-on type of guard. Great improvement has also been made in the method of making frogs. These are either made of high-grade alloy steel or of what is known as the iron-bound type with hard center inserts.

We must bestir ourselves to hold our patronage by giving to our passengers the closest approximation we can to the comfort they enjoy in "riding on rubber." If we do not, we may expect to see them drifting away in greater numbers. All the time and efforts of the way engineer have been directed toward developing a type of track that will accomplish this and at the same time will give maximum length of service at minimum cost.



Development of rail as used in Baltimore from the earliest horse car days up to the present

Spokane Falls at night, a picturesque scene in the center of the city

Suburban station on the newly-electrified Lackawanna system, showing the attractive type of suburban territory served

Serving the SUBURBAN COMMUTER

By

MORRIS BUCK

Engineering Editor

Electric Railway Journal

PROMINENT among the transportation facilities which have contributed to the development of many of our modern American cities is the suburban service offered by the main line railroads. Begun within a comparatively few years after the steam locomotive had been invented and the railroad had become a reality as a means of travel, suburban service has been developed more and more intensively, until today it stands in a distinctive class as one of the essential transportation facilities of the large community.

At the outset, the use of the available facilities of the steam railroads for commuter traffic seemed logical, both to the residents of the cities and to the managements of the roads themselves. Nearly every system entering a city of any size, particularly where a terminal was located, had obtained a choice site for a passenger station. In the days of railroad expansion it was considered essential to locate such a station as near as practicable to the center of business activities. At a time when freight traffic was comparatively light, little difficulty was experienced in scheduling passenger trains at convenient hours to serve the needs of executives and office and factory workers who desired to live along the line of the road. Since it was considered that the tracks and other facilities would have to be provided anyhow in order to handle through passengers and freight, it was only natural that reduced rates were offered to induce regular riders to use the suburban service which could be given with relatively small additional investment. Monthly, quarterly and annual tickets have been sold at rates far lower than the regular one-way fares, sometimes as little as one cent a mile if all the rides on the tickets are used.

As a consequence of this policy, in many cities a large business has been built up that has become an essential part not only of the railroad system, but of the community. In some instances it has brought a profit to the railroads and in others it is questionable today whether the service is operated at a profit or at a loss. But in any event, the growth of the communities has been fostered by this activity of the railroads.

Generally speaking, suburban railroad service antedated the street railway, and was operated for many years before there was a thought of the use of electricity as a motive power. At first, the ordinary passenger coaches and locomotives were employed, but later some of the railroads developed locomotives which were able to produce higher acceleration rates and coaches which were particularly fitted to the needs of commutation service.

Under conditions of a generation ago, with no other form of rapid transit available, the suburban service of the steam railroads furnished the only means through which the worker in a large community could live very far away from his business. With convenient terminals, it was quite possible for workers to spend a comparatively small amount of time in travel and reach points offering the advantages of country or suburban life. While the cost of transportation to the individual was not negligible it was not so high but that a considerable class of people found it possible to build homes at distances of 5 to 20 miles from the congested area. Naturally it was the more substantial element of a city that did this. As a result, the steam railroad has always had a high class clientele for its suburban business.

While the advent of electricity opened up many new possibilities for railroad suburban service, comparatively few systems adopted the new motive power at once. Those that did so were forced to it by public opinion or by legislative enactment. Even today a number of railroads are continuing steam service for this class of traffic with a considerable measure of success. The most progressive ones, however, have electrified in order to cope with the demands for rapid, clean and frequent service.

Woodside, one of the principal junction points on the Long Island Railroad, uses flush platforms

It is well to look into the possibilities of railroad suburban service as compared with those of rapid transit lines of the ordinary type. Naturally, speed is one of the prime essentials of suburban roads of either type. As to convenience, in some respects the rapid transit line probably has the better of it, since it does not need a single terminal in the heart of the city, but can operate through the entire length of the business district with stations at many convenient points. Against this, the main line railroad offers the advantages of comfort and a time-table which may be adhered to rigidly. As a rule, seats are provided for all passengers and many facilities are offered for the comfort of passengers, such as wider cars with cross seats, better upholstering, better lighting and ventilation, and smoking compartments, which are lacking in the more intensive rapid transit service. The fares being materially higher, undoubtedly the best class of travel is attracted to the suburban railroad, and this makes it necessary to do many things to keep the good will of the riding public.

Granted that railroad rights-of-way and facilities are available, it is much more logical to develop them for suburban service than to build competitive rapid transit lines, particularly subways. Accordingly, if a railroad already serves the territory it would appear much better and decidedly cheaper to electrify it and if necessary to construct short sections of subway in the business districts to provide for the distribution of passengers. This plan has been adopted in the electrification of the Pennsylvania Railroad in and about Philadelphia. Suburban trains will be diverted to a subway reaching the central district.

Suburban service has been of much benefit to Philadelphia. When the Pennsylvania electrified its main line a number of years ago, it opened up a territory for some 20 miles to the west of Philadelphia for commuters working in the city. This section has grown remarkably. Following closely on the conversion of this route, the Chestnut Hill branch was electrified, with a quite similar development of the territory served. The line to Wilmington was equipped about two years ago and is at present undergoing an increase of business. With the complete electrification of the Pennsylvania system between New York and Washington, suburban service will be given electrically as far as Trenton, and further growth of the communities along the line is anticipated. Electrification of the suburban lines of the Reading Railroad, which is now taking place, will put this system on a par with the Pennsylvania as a means of serving suburban residents in and about Philadelphia. In all these installations the exclusive suburban character of travel has been retained, so that there is no direct competition with the city-owned subways and elevated lines.

Suburban trains are operated successfully in several places on the Pacific coast by the Southern Pacific System and its affiliated lines. Views of the Alameda-Oakland lines appear on page 370.

Another possibility for the utilization of existing facilities for intensive service is to connect them with existing rapid transit lines for distribution of passengers in the business district. This has been urged many times. There are, however, comparatively few instances where the plan has been worked out. The most notable of them is the Ashmont extension of the Boston Elevated Railway's Cambridge-Dorchester subway. This route, with the surface trolley line extension to Mattapan, is nearly all on the right-of-way of the New York, New Haven & Hartford Railroad. The route has been equipped for rapid transit service at a cost much less than would have been necessary to build a competing subway. The capacity has been increased far beyond anything possible with steam traction, or even electrification of this one line as a part of the railroad service. It must be remembered, however, that in developing the line in this manner its character has been changed completely, and true rapid transit service is now being furnished instead of suburban commuter service. Steam railroad facilities are also to be used for rapid transit purposes in Cleveland. There several railroad lines are being electrified to form a rapid transit system entirely apart from the surface car system.

As a community builds up, naturally it becomes impossible to continue giving the same class of suburban service as was possible with low concentration of population and small amounts of traffic. As the demand grows, the congestion increases. Trains must be made longer and headways shortened until the service automatically approaches that given by rapid transit lines. This is what has occurred on the Long Island Railroad, serving principally the Borough of Queens in New York City. The Long Island Railroad has been faced with the necessity of providing what is virtually rapid transit service to the detriment of the riders who desire to travel to suburban points outside the city.

Under present-day conditions successful suburban service demands electric operation. The traffic densities are almost invariably too great to permit of satisfactory service with steam locomotives. Use of multiple-unit trains will increase the capacity of a stub terminal from 20 to 30 per cent, while with a through terminal or a loop station the increase in capacity may be even greater. With multiple-unit trains many of the problems involved in locomotive operation are entirely absent. Maximum acceleration can be obtained along with reasonably high speeds so that running times can be shortened materially. With electric heating and lighting of the cars, there is no necessity for frequent trips to a terminal or roundhouse, and the cars can be operated with little or no attention, save for periodic cleaning and inspection. Absence of smoke and dirt also have been popular.

As to the best type of equipment for suburban service, there is comparatively little diversity of opinion. Most of the roads use coaches of the ordinary steam railroad type, all or a portion being equipped with electric motors and control, the others being used as trailers. In a few instances, notably the Illinois Central Railroad, cars of a distinctive type have been developed for suburban service. All the cars have been designed for use with flush station platforms. These are desirable, as they save several seconds at each stop and make it easier for passengers to board and alight. On nearly all of the other railroads giving suburban service there are low station platforms, only a few inches above the rail level. On the Long Island Railroad a considerable number of the stations have flush platforms, while others have low platforms. This necessitates the use of trap doors which must be raised by hand at stations with low platforms.

A distinctive feature of railroad suburban service that has contributed much to its popularity as compared with rapid transit is the adoption of time-tables of the steam railroad type which make use of individual combinations of station stops for each trip. Trains may be run local for the entire distance, express for the entire distance, or there may be a combination of the two types of service on any train. A careful traffic analysis is made and the schedule is adapted to the requirements for that particular trip. If the headways are greater than the minimum it is thus possible to give a superior service, even though only a single track is available in each direction. This is distinctly contrary to the principles of rapid transit, where all trains of one class stop at certain designated stations, locals stopping at all local stations and expresses stopping at express stations only. As traffic density increases, however, it becomes more and more difficult for a suburban railroad to give more than a single class of service on one track and, as stated elsewhere, standard rapid transit operation is approached.

Intensive suburban service with electric trains is given on the main lines of the Pennsylvania Railroad with a terminus in the heart of Philadelphia

One element of cost that has a great deal to do with the difference in operation between trunk line railroad suburban service and rapid transit is the method of payment for labor. Rapid transit trainmen are almost always employed on an hourly basis, while trainmen in railroad service are paid on a mileage basis. This makes it possible for the railroads to schedule trains with much more flexibility. Coupled with greater lengths of route, favorable time-tables can be made up with minimum labor cost and with little waste service during the nonrush hours.

The length of the commuting zone varies with the type of community and the service furnished. Some roads have catered to this class of service in one or more communities and accordingly have built up larger or smaller districts, suburban in character and tributary to the central district. Striking differences have existed on this account in comparable territories. For instance, the writer knows of one example where two parallel trunk line railroads pass through quite similar territories. One of them gave an intensified local passenger service and as a result developed suburban towns on an average of one to two miles apart for a distance of 40 miles, while the other one had practically no suburban development along its line.

The "richest hill on earth," at Butte

East Park Street, in the business section of Butte, where local transportation is furnished by the Butte Electric Railway

One of the four hydro-electric plants with a total capacity of 240,000 hp., developed by the Montana Power Company on the Missouri River in the vicinity of Great Falls, is shown below

Utah Agricultural College at Logan is in the territory served by the Utah-Idaho Central Railroad

City Common of Anaconda, maintained by the Anaconda Copper Mining Company, which operates the street railway system

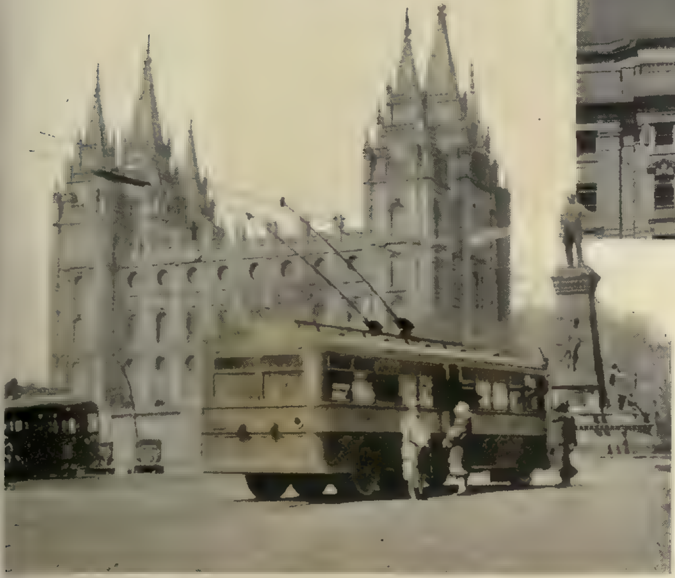
"NET" can come from two sources—increased earnings or decreased expenses. Improvements in design can bring about both. For some time past we have been attempting to attract riders through improved appearance, riding comfort and speed.

The electric coach attracts riding not alone because of its appearance and comfort, but largely because the rider is impressed with a sense of speed. A modern street car on a good track furnishes a comfortable ride, but a rubber-tired vehicle with its flexibility, quietness and light weight, permitting rapid acceleration, very nearly approaches the ideal mass transportation unit for the average city.

E. A. WEST.

General Manager
Utah Light & Traction Company
Salt Lake City, Utah

Main Street, Salt Lake City, looking north toward the Capitol



One of the electric coaches in Utah's capital city. The famous Mormon Temple is in the background and the statue of Brigham Young is at the right

Modern interurban terminal at Salt Lake City, used by the Bamberger Electric Railroad, which runs north to Ogden, and the Salt Lake & Utah Railroad, which extends south to Payson

Twenty-six electric coaches are operated by the Utah Light & Traction Company. In the business district they use the street car safety zones

The co-operative installation or use of ornamental poles for the support of overhead structures occasions a favorable public reaction

Increased Power Department Responsibility Demands PROPER EQUIPMEN

TODAY the activities of the power department of the average modern street railway extend far beyond the responsibility of supplying, through a system of distribution and contact structures, a continuous and economical source of propulsion energy for the movement of cars. The leaders in the industry acknowledge this and, therefore, no longer feel that the scope of power development responsibility ends with the production and distribution of electrical energy, but that it has a real place and constitutes an important part in the general scheme of building up and maintaining friendly relations with patrons of the company and the public at large.

The question is then asked: What are the conditions or qualifications necessary to enable the power department to fulfill best its place according to the modern conception, wherein the sphere of departmental responsibility has been increased?

Primarily these may be classed as follows: continuity of power supply; modern equipment and practices properly maintained; a company policy regarding the public in general, wherein the department, as a unit of the entire company, recognizes and fulfills its responsibility to the public as well as to the company through a more or less definitely prescribed company channel.

In perusing the three major qualifications and realizing that the one incentive behind the whole structure is to build up a business by demonstrating the ability and desire to serve, one cannot but realize that accomplishment of the desired end is at least impracticable, if not impossible, should any one of the three qualifications be absent.

Dependable service cannot be rendered if the source of power frequently fails. Continuity of power supply cannot be maintained utilizing antiquated equipment or antiquated operating and maintenance methods. Harmonious public relations cannot be maintained if the foregoing qualifications are not fulfilled. On the other hand, the most modern methods and equipment rendering 100 per cent service cannot discount the ill effects of poor public relations or an antagonistic local governmental body. Therefore, one or even two of the qualifications without the third will be of no avail. The triad must exist. In this article it is the intention of the author to discuss briefly only one of these qualifications; namely, modern equipment and practices.

The electric railway industry has witnessed no development quite so revolutionary and far-reaching as the perfection and adoption of the automatic substation. During the sixteen years since the first station of this type was placed into operation, the cost of power delivered to the car has been decreased, accompanied by increased reliability of service and greater freedom from labor troubles on systems where the automatic plant has been installed to any extent. In interurban service this type of plant, even in its simplest form, has demonstrated its ability to render satisfactory performance at a material decrease in operating costs when compared with operating costs of the former manually operated plants. In metropolitan service a full complement of automatic equipment, operated in conjunction with remote and supervisory control and a properly designed distribution system, establishes a power system which, because of its many power supply points located advantageously about the entire system and its extreme flexibility, guarantees a continuity of power supply to the system that can be accomplished in no other way and at a lower cost of power at the car than was possible with former methods of distribution.

Remote and supervisory control, utilizing various colored lamps for indicated condition of conversion and distribution system control equipment

nd PRACTICES

By

L. D. BALE
Superintendent of Power, Cleveland Railway
First Vice-President
American Electric Railway Engineering Association

The mercury arc rectifier has advanced to a position where, in certain types of service, definite advantages may be gained by its use. The efficiency characteristic f this device at fractional loads causes it o be particularly well adapted when, or a greater percentage of the time, the nature of the oad is such that the quipment is but artially loaded. The ectifier, in its simplest form, is less complicated and less costly to install than rotating equipment installed for automatic operation. The cost of maintenance should likewise be lower. However, when considering major sources of power in metropolitan service, additional features which must be considered in many instances invalidate the advantages of the rectifier and cause rotating equipment to be selected. Paramount among these features is the fact that conversion equipment in this class of service is generally operated at or near capacity as long as it remains in service, particularly if automatic control is employed and the stations and distribution system are under remote and supervisory control. Furthermore, to protect fully the operation of the rectifier in major plants, duplication of the water cooling system, employing some form of recirculating system in addition to the normal supply of water from the city mains, would be necessary. Likewise, serious telephone interference is very apt to be encountered when rectifier equipment is operated in metropolitan areas. Prevention of such a condition would necessitate the installation of additional apparatus not required with rotating equipment.

With the advent of the automatic substation has come not only an entirely new type of housing structure, but

Mercury arc rectifier substation equipment for 600-volt d.c. service. Above—Installation of the Long Island Railroad at Hempstead. At left—Equipment of the Connecticut Company at Bridgeport

likewise new ideas, aesthetic in their nature, regarding the surroundings of the building. The substation building no longer takes the form of conventional factory structure for in some instances where stations have been located in suburban residential areas it would be difficult for the uninformed to distinguish the substation building from neighboring residences. By these means, the engineer has been able to realize upon the advantages offered by the automatic plant and obtain a source of power supply in territories where heretofore it was necessary to absorb the heavy power losses and annual charges due to long distribution cable or suffer low operating voltage with its adverse effect upon car schedules.

In applying the automatic substation, particularly to the metropolitan field, the necessary feeder calculations are considerably more extensive and exacting than was generally the case with the larger capacity manually operated plants. The smaller capacity of the automatic plant and the relatively confined area which it is intended to feed makes it necessary to work within closer limits than formerly. The problem of reserve capacity is no longer solved by installing spare equipment in each substation.

Removing old and stringing of new trolley wire in one operation

The close proximity of the power sources permits of a more economical method and insures greater continuity of power supply to the system as a whole. Due to this new arrangement, the distribution system is utilized to make available the capacity of the entire system which may not be in use at any particular moment. To accomplish this result a close adjustment of the ohmic resistance of the feeder system between stations is necessary so as not to unbalance the load between stations.

The supervision of a number of automatic plants in metropolitan service, particularly where they constitute major sources of power, is an essential factor in obtaining the maximum economy and the highest guarantee for continuity of service. Superimposing some form of remote and supervisory control upon the automatic features of the conversion equipment and the outgoing direct current distribution control system, by means of which a dispatcher may at all times be fully acquainted with conditions on the system and in which he has at his disposal means to change conditions instantly whether due to routine operation or emergencies, constitutes without question the greatest insurance for efficient operation and a continuous supply of energy to the cars.

Simultaneously with the development of the automatic substation, the remote and supervisory control system and the new conception of the distribution system, which constitutes one of the greatest contributions the engineer has made to the industry, great strides have been made elsewhere within his jurisdiction. The great improvement in performance of overhead contact and distribution systems, in many instances at a reduced cost per mile, is certainly worthy of comment. Year by year due to intensive study and the research work of the railways and the manufacturers new low records are being established for trolley wire breaks. The stringing of trolley using the dynamometer method, rigid inspection on a car mileage basis rather than at definite periods regardless of car passages, dependable reports and the schooling of employees are chiefly responsible for this marked improvement. The industry is indebted to the several A.E.R.E.A. Power Committees which have made studies and prepared reports upon this and allied subjects. These reports have not only created influence toward standardization, making possible the procuring of better materials, but they also have been the means of placing before the individual engineer a cross section of what the industry as a whole is accomplishing. As a result they have given him new insight and an incentive for additional work.

Since one of the prime factors in the delivery of a continuous supply of power to the car is the contact system, it behooves the engineer to eliminate every trolley break possible from whatever cause. In this connection it has been noted, in perusing the reports of various railways, that there is more or less of a universal increase in the number of trolley breaks under the so-called uncontrollable classifications. These are due to pull-downs or burn-downs by railway equipment, in most instances improperly operated, or by objects of unusual dimensions being transported through the city streets.

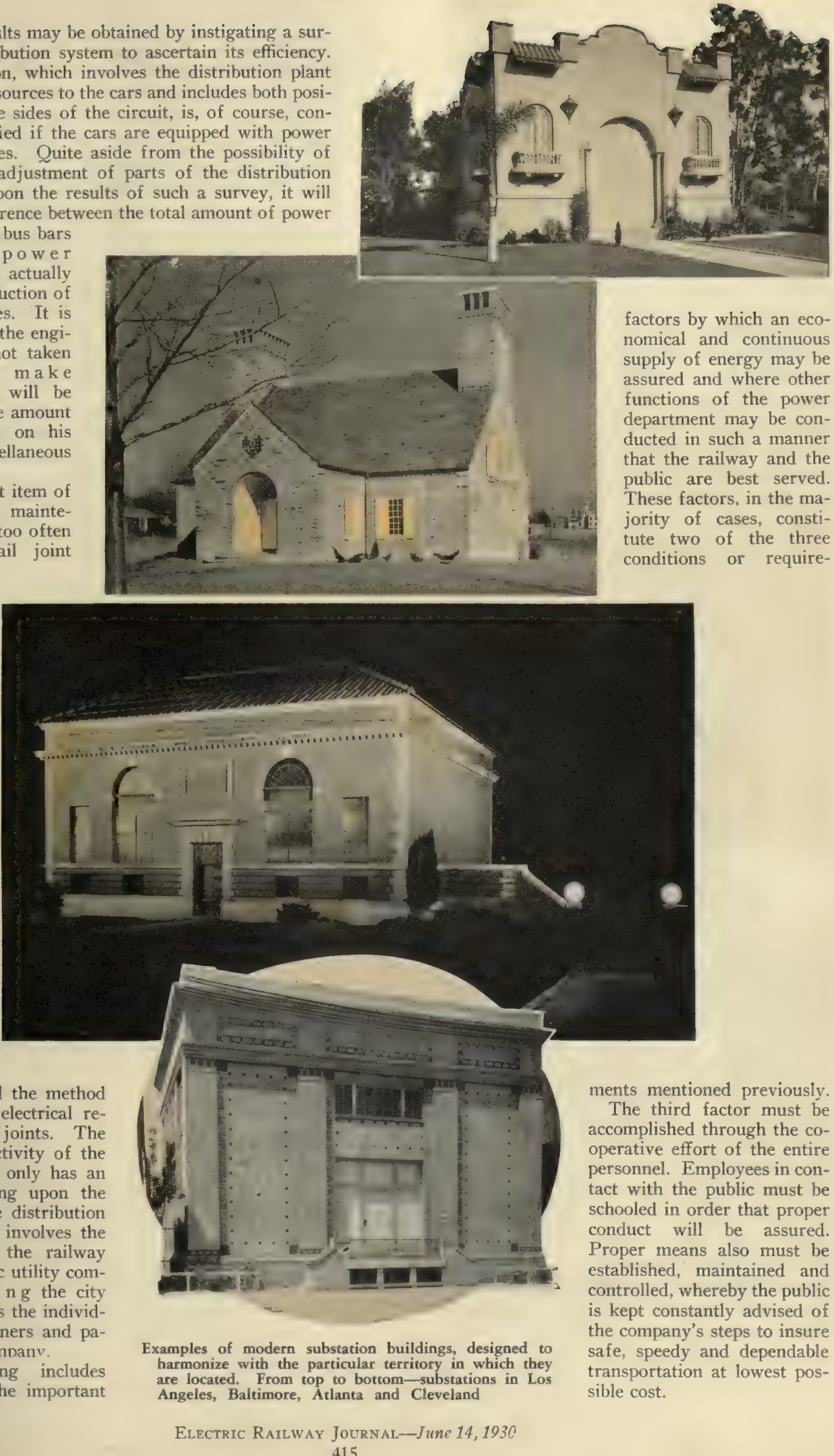
Much favorable public reaction may be occasioned by the co-operative installation or use of some form of ornamental pole for the support of overhead structures, particularly if the channels are available whereby the public can be made to realize that the railway, by such acts, is interested in contributing to the civic improvement of the community. There have been several installations within the past two years where railway poles, street lighting standards and traffic signal standards or poles have been replaced by the use of one structure resulting in a greatly improved appearance of the thoroughfares.

Profitable results may be obtained by instigating a survey of the distribution system to ascertain its efficiency. This investigation, which involves the distribution plant from the power sources to the cars and includes both positive and negative sides of the circuit, is, of course, considerably simplified if the cars are equipped with power measuring devices. Quite aside from the possibility of advantageous readjustment of parts of the distribution system, based upon the results of such a survey, it will indicate the difference between the total amount of power drawn from the bus bars of the system power sources and that actually used in the production of revenue car-miles. It is safe to say that the engineer who has not taken the occasion to make such a survey will be astonished at the amount of energy used on his system for miscellaneous purposes.

One important item of electric railway maintenance, which is too often neglected, is rail joint onductivity and the method f determining electrical reistance of rail joints. The lectrical conductivity of the ack joints not only has an nportant bearing upon the fficiency of the distribution ystem but also involves the lationship of the railway ith other public utility comnies utilizing the city reets as well as the individal property owners and paons of the company.

The foregoing includes t a few of the important factors by which an economical and continuous supply of energy may be assured and where other functions of the power department may be conducted in such a manner that the railway and the public are best served. These factors, in the majority of cases, constitute two of the three conditions or requirements mentioned previously.

The third factor must be accomplished through the cooperative effort of the entire personnel. Employees in contact with the public must be schooled in order that proper conduct will be assured. Proper means also must be established, maintained and controlled, whereby the public is kept constantly advised of the company's steps to insure safe, speedy and dependable transportation at lowest possible cost.

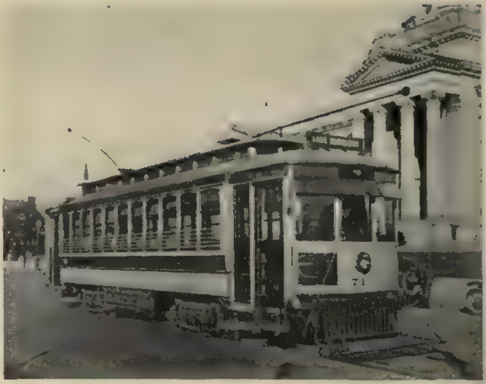


Examples of modern substation buildings, designed to harmonize with the particular territory in which they are located. From top to bottom—substations in Los Angeles, Baltimore, Atlanta and Cleveland

Colorado Springs & Interurban cars at the city's busiest corner. Pike's Peak may be seen in the distance

BY IMPROVING our track, speeding up schedules and insisting on courtesy, we are providing the most satisfactory service possible with existng vehicles. More modern equipment, along the lines being developed, is necessary to raise our standards higher. Such equipment should be of standard design, along automotive lines, with prices reduced to a minimum.

W. N. CLARK
Vice-President and General Manager Southern Colorado Power Company
Pueblo, Col.



Car of the Southern Colorado Power Company in Pueblo

Downtown Denver, as seen from the State Capitol

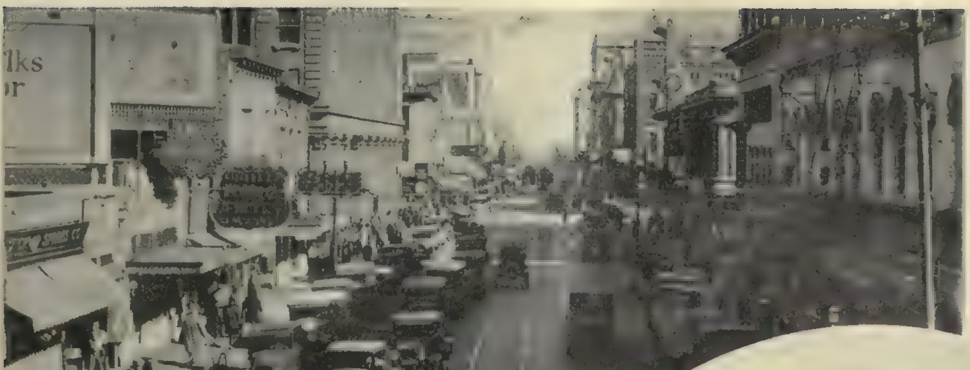
Sixteenth Street—the main thoroughfare of Denver's business section

IMPROVED design in street car and bus equipment is an important factor from the standpoint of civic pride, as well as in consideration of improved service. Though we haven't reached the point where it is necessary to bring out new models every year, as the automobile makers do, attractiveness and comfort play a tremendous part today in service effectiveness.

H. S. ROBERTSON
President Denver Tramway
Denver, Col.

State Capitol of Colorado and a part of the Denver civic center

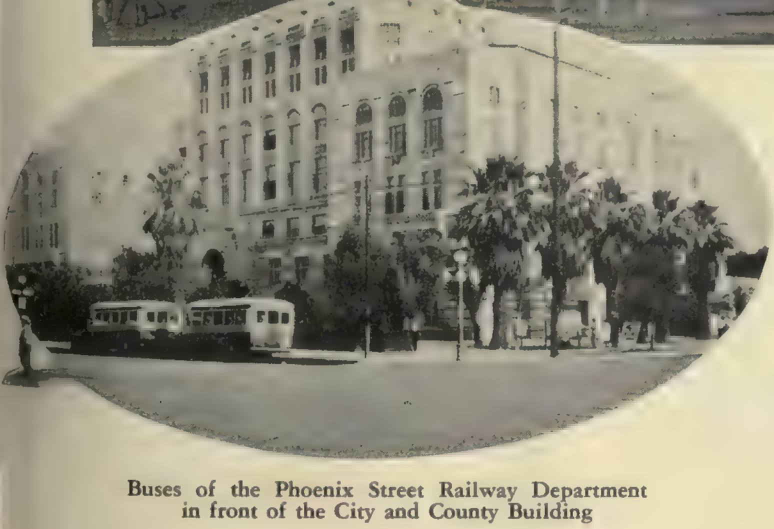
San Antonio St., a heavily-traveled artery in the business district of El Paso



One of the bridges over which the El Paso Electric Company operates cars to Juarez, Mexico

The "heart" of El Paso—San Jacinto Plaza

San Xavier Mission, Tucson, the oldest mission in this country



Buses of the Phoenix Street Railway Department in front of the City and County Building

WITH the great number of automobiles in use now the electric railways must make their track, equipment and service approach that of the private vehicles if they expect the public to ride the cars. Our experience indicates that neat, comfortable and speedy cars, operated on a smooth roadbed, offer a real inducement to prospective patrons. Following the rehabilitation of our system, involving the reconstruction of our worn-out track and the replacement of our antiquated cars with new vehicles, revenues increased from 25 to 60 per cent.

C. E. Newcomer
Superintendent Phoenix Street Railway Dept.
Phoenix, Ariz.

The mill room, located directly behind the body repair tracks. This arrangement was adopted for all the departments

MODERN MACHINERY

A Sound Investment for

Better Maintenance

By

E. J. JONAS

Superintendent of Equipment
Cincinnati Street Railway
Cincinnati, Ohio

EXPERIENCE has proved that most car equipment of the conventional design can be made reliable and reasonably quiet in operation by efficient inspection and maintenance standards, the price of which is good tools plus eternal vigilance. With these two allies many electric railway properties have made real progress in keeping their cars in better condition at a lower cost. Great reductions in number of pull-ins and increases in mileage without mechanical difficulties serve as the tangible proofs for many systems of this program.

Well-arranged shops and carhouses, furnished with modern machinery and equipment, have played an extremely important part in improving the quality of work and, more particularly, in reducing costs. Adequate maintenance facilities and the provision of the proper machines for doing the many types of work are being considered essential by more and more companies. They realize the opportunities for savings in labor and equipment and that the resulting economy makes the additional or improved facilities a good investment.

A little more than two years ago the Cincinnati Street Railway completed its Winton Shop and transferred its operations from the old Chester Park Shops. Much thought was given to obtaining the best possible design and location of the building proper. In line with an efficient building layout, the company provided all the necessary modern machines and equipment for the efficient overhauling and maintenance of its rolling stock.

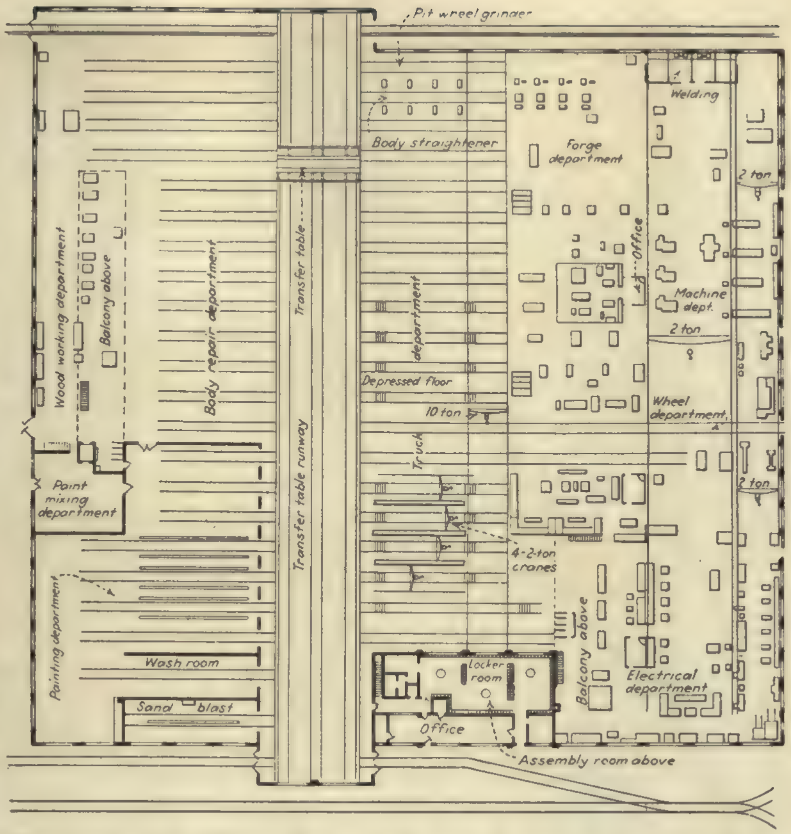
The steady increase in car-miles per disabled car from an average of 4,500 in December, 1927, to 20,000 in September, 1929, and the gradual decline in maintenance cost per car-mile, show a justification for the investment made in these modern facilities for street car upkeep. Many of the practices in maintenance work made possible by the new shop and its equipment are relatively insignificant in themselves as compared to the whole; many of these accomplishments are more the result of providing workmen with facilities and surroundings that encourage initiative and individual effort rather than the installation of labor-saving machinery.

Idle Workmen or Idle Machines?

In selecting new shop equipment it is advisable to obtain the best possible machine for the work to be performed, bearing in mind that an idle tool is unprofitable. In cases when such a tool will only be used occasionally, it is best to purchase the least expensive. On the other hand, an idle workman is more expensive than an idle machine; therefore, adequate equipment must be available in order that man-hours will not be lost on this account.

In the electrical department of the new Winton Shop the equipment includes five welding sets, two automatic wheel welding heads, two armature baking ovens, an electrically heated cleaning tank, a waste-treating plant and nine grinders of various types. Metal-working machines include ten lathes, a 400-ton car-wheel press, numerous grinders and drills, and other useful equipment. A very complete array of machines is provided in the woodworking department. Other equipment of special interest includes two cleaning ovens, a car-body straightener, an air-valve test bench, a special sand blast, a car spray hood, a combination transfer table and car hoist and a telescoping air jack. In an accompanying table all of the important machines and tools are listed.

Section of the wheel department with its array of modern machinery for maintaining and reclaiming wheels



Floor plan of the Winton Shop. Body work is done on one side of the transfer table runway and all truck and electrical work on the other side

A slight modification of the principle of designing a shop so that each track will hold but one car was made to bring about a more harmonious floor plan. In the erecting department four of the tracks are long enough to accommodate two cars. This does not interfere with the general scheme, however, as cars that must remain in the shop for a longer period are placed at the far ends.

The principle of keeping all body work on one side and all truck and electrical work on the other side was recognized in the floor plan. To facilitate the placing of the car body in one department and the trucks in another at the start of the overhaul it was decided to place a car hoist directly on the transfer table, doing away with the necessity of equipping each erecting shop track with an individual hoist. This arrangement has since proved to be ideal for this shop, no confusion or congestion resulting from movement off or on the transfer table. It is provided with a power cable reel for moving cars and trucks with motors and a motor-driven winch for moving equipment not having motive power. The car hoist consists of two 15,000-lb. overhead hoists, each having two drums on one shaft with hooks at the lower ends of cables that permit raising car bodies to a height of 6 ft. This height permits a thorough and final inspection of the body, brake rigging, side and center bearings, and other parts.

No live trolley wires are suspended over repair tracks, since the movements are very short and can be accomplished by means of cable leads or the power winch and rope.

In locating the various tools and machinery, care was taken to place them so that the parts being overhauled would be moved a minimum distance. The present output of eight overhauled cars per week of 45 working hours is not an adequate indication of the capacity of this shop, since much of the work being done at present consists of rebuilding rather than overhauling.

Provisions for Handling Materials and Parts

Physical exertion is reduced to a minimum in the handling of parts and supplies by means of numerous jib cranes and an electric industrial truck with elevating platform of the high lift type. The shop also is equipped with one 10-ton and nine 2-ton floor-operated traveling cranes.

When motors are removed from trucks they are placed on platforms that permit the lift truck to pick them up without further handling, and are delivered to the motor repair section. Mounted wheels are transported in like manner. Air compressors, controllers and resistors as well as all supplies from the storeroom, are also handled by this truck.

Incoming motors are placed near the cleaning tank where housings and armatures are removed. Housings are placed in the cleaning tank, while armatures are passed down to the winding section for dipping and baking. They are then taken to the bending lathe, and finally are removed to the armature bench near the vertical boring mill and bearing press. By this time cleaned housings have also arrived at this point. The bearings are then checked and new bearings bored to the correct fit if new ones are needed. All armatures and axle bearing housings are kept with their respective motor frames when being reassembled. After motors

Equipment Installed in the Winton Shop of the Cincinnati Street Railway

Electric Equipment

3	Wldg. mtr.-gen. sets—300 amp	Westinghouse Electric & Mfg. Co.
1	Wldg. mtr.-gen. set—175 amp	Westinghouse Electric & Mfg. Co.
1	Wldg. mtr.-gen. set—400 amp	General Electric Co.
1	Welding transformer—150 amp.	Gibb Instrument Co.
1	Automatic wheel welding head	Westinghouse Electric & Mfg. Co.
1	Automatic wheel welding head	General Electric Co.
1	Armature baking oven—28 kw	Westinghouse Electric & Mfg. Co.
1	Armature baking oven—21 kw	Westinghouse Electric & Mfg. Co.
2	Babbitt pots—300 lb	General Electric Co.
1	H. L. control test set	Westinghouse Electric & Mfg. Co.
1	Battery charger—50 amp	Electric Products Co.
1	Electric high-lift truck	Elwell-Parker Electric Co.
1	Elec'cally-heated cleaning tank	*
1	Waste-treating plant	*
1	Lumber-heating oven	*
1	Snagging grinder	Cincinnati Electric Tool Co.
4	Dry grinders—12 in	Cincinnati Electric Tool Co.
1	Dry grinder— 8 in	United States Electrical Tool Co.
1	Tool grinder—12 in	Cincinnati Electric Tool Co.
2	Dry grinders— 6 in	Cincinnati Electric Tool Co.
1	Buffing lathe	Hisey-Wolf Manufacturing Co.
1	Band saw brazer	Oliver Machinery Co.

Forge Shop Equipment

1	Air hammer—800 lb	Nazel Engineering & Machine Works
1	Blacksmith's helper	Blacker Engineering Co.
1	Forging furnace	Strong, Carlisle & Hammond Co.
1	Shoe bolt forging machine	*
1	Shoe bolt forging furnace	*
4	Down draft forges with blowers	Buffalo Forge Co.
3	Surface plates	*
4	Iron storage racks	*

Metal Working Machine Tools

1	Engine lathe—16 in. x 8 ft	American Tool Works
1	Engine lathe—20 in. x 8 ft	American Tool Works
1	Engine lathe—24 in. x 10 ft	American Tool Works
1	Engine lathe—25 in. x 12 ft	R. K. LeBlond Machine Tool Co.
2	Engine lathes—24 in. x 10 ft	R. K. LeBlond Machine Tool Co.
1	Toolroom lathe—12 in. x 8 ft	Lodge & Shipley Machine Tool Co.
1	Turret lathe, flat turret	Acme Machine Tool Co.
1	Turret lathe, semi-automatic	Acme Machine Tool Co.
1	Car wheel lathe	Niles Tool Works
1	Car wheel press—400 tons	Niles Tool Works
1	Car wheel grinder	Springfield Manufacturing Co.
1	Axle grinder—18 in. x 8 ft	Norton Co.
1	Car wheel borer—48 in	Niles Tool Works
1	Vertical boring mill—34 in	King Machine Tool Co.
1	Horizontal boring mill—32 in	Lucas Machine Tool Co.
1	Milling machine—No. 4	Cincinnati Milling Machine Co.
1	Shaper—32 in	Smith & Mills Co.
1	Shaper—16 in	Smith & Mills Co.
1	Radial drill—5 ft	Cincinnati Bickford Tool Co.
1	Radial drill—4 ft	Dreses Machine Tool Co.
1	Planer—42 in. x 42 in. x 16 ft	Cincinnati Planer Co.
1	2-Spindle drill	Fosdick Machine Tool Co.
2	Sensitive drills	United States Machine Tool Co.
1	Sensitive drill	Canedy-Otto Mfg. Co.
1	Punch press—No. 21	E. W. Bliss Co.
2	Upright drills—24 in	Cincinnati Bickford Tool Co.
1	Upright drill—21 in	Cincinnati Bickford Tool Co.
1	Squaring shear—5 ft	Bertsch & Co.
1	Bolt cutter—2 in	Acme Machinery Co.
1	Bolt cutter—2 in	Landis Machine Co.
1	Universal shaping saw	Peerless Machine Co.
1	Hack saw	Peerless Machine Co.
1	Cutter grinder	Oesterlein Machine Co.
1	Drill pointer	Oliver Instrument Co.
1	Toolroom upright drill	Fosdick Machine Tool Co.
1	Straightening roll	Bertsch & Co.
1	Portable pipe threading machine	Robbins & Campbell Co.
1	Centering machine	E. W. Whiton Machine Co.
1	Nibbler shear	W. J. Savage Co.

Woodworking Machine Tools

2	Band saws—42 in	J. A. Fay & Egan Co.
1	Swing saw	J. A. Fay & Egan Co.
1	Planer—No. 2	J. A. Fay & Egan Co.
1	Mortiser	J. A. Fay & Egan Co.
1	Shaper	J. A. Fay & Egan Co.
1	Universal wood worker	J. A. Fay & Egan Co.
1	Rip and cut-off saw	J. A. Fay & Egan Co.
1	Roll sander	J. A. Fay & Egan Co.
1	Tenoner	J. A. Fay & Egan Co.
1	Knife grinder	J. A. Fay & Egan Co.
1	Band saw filer	Black Diamond Saw & Machine Co.
1	Post drill	Champion Blower & Forge Co.

Hand-Operated Tools

1	Hand punch	*
1	Slitting shear	Excelsior Tool & Machine Co.
1	Punch press	Standard Machinery Co.
1	Folder	Peck, Stow & Wilcox Co.
1	Slip roll former	Peck, Stow & Wilcox Co.
1	Pipe bender—2 in	American Pipe Bending Machine Co.
1	Arbor press—No. 4	Atlas Press Co.
1	Arbor press—No. 0	Atlas Press Co.
1	Brake—10 ft	Dreis & Krump Mfg. Co.
1	Hydraulic axle straightener	*
1	Hydraulic armature press	*
1	Axle test stand	*
1	Paper shear	Excelsior Tool & Machine Co.
1	Shear	*
2	Hand lift trucks	Steubing-Cowan Co.

General Equipment

1	Gear pan cleaning oven	*
1	Axle bearing cleaning oven	*
1	Car body straightener	*
1	Toolroom furnace	Bellevue Industrial Furnace Co.
1	Air valve test bench	*
2	Banding lathes	Columbia Mach. Wks. & Mall. Iron Co.
1	Armature dipping plant	*
1	Field winder	*
1	Air compressor—350 cu.ft	Worthington Pump & Machine Co.
1	Sand blast equipment	W. M. Sly Mfg. Co.
1	Sand blast ventilating equipm't	Young & Bertke Co.
1	Sash washing tank	*
1	Car spray hood	DeVilbiss Co.
1	Sign spray hood	DeVilbiss Co.
1	Waste wringer	American Laundry Machine Co.
1	Mill exhaust blower	American Blower Corp.
1	Mill exhaust system	Young & Bertke Co.
1	Sewing machine	Singer Sewing Machine Co.
2	Car body turners	*
1	Electric drill stand	Cincinnati Electrical Tool Co.
1	Forcing press—30 ton	Lucas Machine Tool Co.
1	Transfer table and car hoist	*
2	Electric elevators	Warner Elevator Co.
1	Hydraulic elevator	Warner Elevator Co.
1	Traveling crane—10 ton	Niles Tool Works
8	Traveling cranes—2 ton	Chisholm-Moore Mfg. Co.
1	Chain hoist traveling crane	Chisholm-Moore Mfg. Co.
1	Telescoping air jack	*
1	Water heater	Bryant Heater & Mfg. Co.
46	Unit heaters for shop heating	American Blower Co.
1	Blue print machine	Wickes Bros.
1	Sand drying plant	C. O. Bartlett & Snow Co.
2	Boilers—250 hp	Tudor Boiler Mfg. Co.
2	Stokers	Riley Stoker Corp.
5	Wash basins	Bradley Wash Fountain Co.
186	Lockers	All-Steel Equipment Co.
20	Jib cranes, with Ford chain hoists and trolleys	*
	Office furniture	Globe Wernicke Service Co.
	Fire extinguishers	Knight & Thomas, Inc.
	Pwr. transf'rs and switch b'rd.	General Electric Co.
	Shop motors and control	Westinghouse Electric & Mfg. Co.

*Designed and built by the Cincinnati Street Railway.

are tested they are placed on the motor storage floor on platforms, ready for delivery to the truck department when needed.

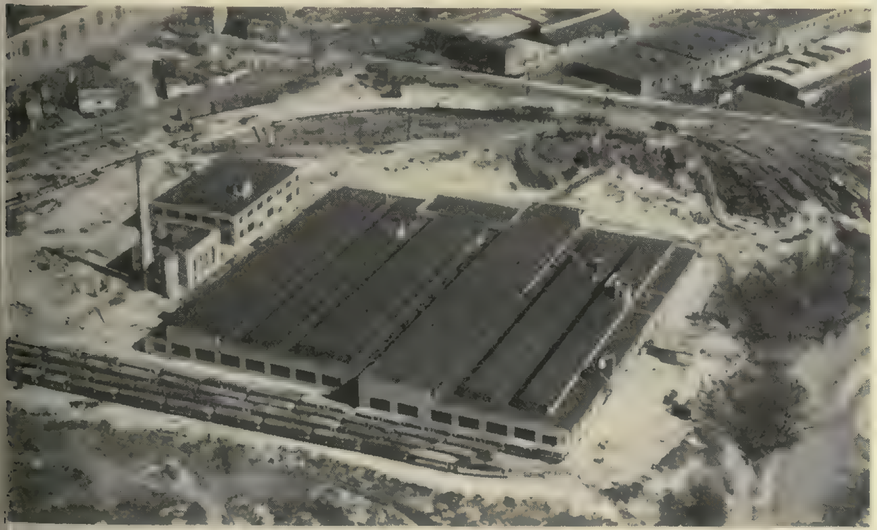
In like manner bad order wheels are delivered to the wheel department for reclaiming or replacement. They are then placed on another track and fitted with axle bearings which are bored on a turret lathe. The bearings are held to the axle by means of spring clips, so that when they are received by the truck department the correct axle bearing is immediately at hand. The practice of boring axle and armature bearings to fit their respective journals has reduced bearing costs approximately 50 per cent.

The vertical boring mill is fitted with jigs which center the motor bearing housings, after the bearings have been pressed in place. They can thus be accurately and quickly bored to the correct diameter to fit the armature journal. This method is just as fast as the step method and greatly increases the useful life of bearings.

Welding equipment, consisting of four a.c.-d.c. motor-generator sets, one d.c.-d.c. motor-generator set and one welding transformer, is used extensively for reclaiming worn and broken parts. Correct gear centers are being restored on all the older type motors by building up the axle and housing fits and reboring on a horizontal boring mill. Reclaiming of steel wheels with an automatic welding machine has resulted in a large saving in wheel costs and the development of automatic heads for other classes of welding will similarly effect other savings. After much speculation as to the actual percentage of time that a manually-operated arc was kept in operation, a check was made with a recording instrument. It revealed that an average of four and one-half hours out of nine were obtained in motor frame welding, and two and one-half hours on brake parts. This information is being used as a basis for paying premium rates.

With the overhead hoist built into the transfer table structure two men can exchange shift trucks for overhauled motor trucks

Spray exhaust hood for the rapid and economical painting of cars


All departments of the Winton Shop are under one roof with the exception of a boiler house and a storehouse. The main building has a floor area of 177,605 sq.ft., more than 4 acres

Standardization on body repair work is almost impossible since a great number of things may happen to a car body while in service. Seldom are two body jobs alike. However, something has been accomplished by building up vestibule fronts on a jig for the wood post cars. The cost of preparing for painting also has been reduced.

The sand blast room has an air cleaner that will handle 10,000 cu.ft. of air per minute. The equipment is installed in an inclosed room and permits a thorough cleaning of the car interior.

NEWS *of the Industry*

LATE NEWS

Alliance, Ohio—Approximately $40,000 is being expended by the Stark Electric Railroad this summer for rehabilitation. The company operates between Canton and Salem, a distance of 30 miles. Fifteen thousand new ties are being placed and several grade crossings are being rebuilt.

◆

Philadelphia, Pa.—The Philadelphia Rapid Transit Company has purchased the Hartel Cab Company, operators of about 25 cabs from the Sixty-ninth Street Terminal here and in Lansdowne. Yellow cabs will replace those formerly owned by the Hartel Company.

◆

Chicago, Ill.—Union employees of the Chicago Surface Lines have signed a new wage and working agreement with the company. The terms include renewal of the wage scale which has been in effect for the last three years. The renewal is for one year from May 31.

◆

Lawrence, Mass. — The Eastern Massachusetts Street Railway made its fourth installation of the weekly pass at Lawrence on May 18. The pass sells for $1.25 against a cash fare of 10 cents and ticket rates of fourteen for $1, and Belt Line rate of six for 50 cents. The Brockton division added a pass Nov. 3, 1929; Lowell, Dec. 29, 1929, and Haverhill, Jan. 24, 1930.

◆

Seattle, Wash. — Agitation for construction of a loop to replace the wye at the north end of the Phinney-Greenwood Municipal car line, North 85th Street and Greenwood Avenue, is being revived. Building of the loop would require the purchase of private property for right-of-way as Phinney Avenue is not cut through in this area. The purchase and the loop construction would cost about $30,000.

◆

St. Louis, Mo.—The General Taxicab Company ceased operations at 4:30 p.m. on June 9 because it was unable to meet the demands of the Chauffeurs Union for payment in full of wages due the 125 chauffeurs normally employed, or post a cash guarantee that the wages would be paid. The company has been holding back five days wages of employees in making up its payrolls. It has been named defendant in bankruptcy proceedings. Forty-four of the company's 66 cabs were in operation on June 9.

◆

Los Angeles, Cal.—The Pacific Electric Railway has applied to the Railroad Commission for authority to issue two notes of the face amount of $311,846 each, to Motor Transit Terminal Corporation, in part payment of the purchase of capital stock of Motor Transit Company, operating an extensive auto stage service in southern California. The notes are to be dated Jan. 1, 1930, and one is to be payable July 1, 1931, and the other on Dec. 31, 1931.

(Late News Continued on Page 424)

Auto Does Not Justify Its Use of St. Louis Streets

Merchants Misguided About the Value to Them of Customers Who Come to Stores in Their Own Cars—Five Times as Many Carried by Street Car as by Auto

TO DETERMINE accurately the character of traffic in the business district of St. Louis, Mo., the St. Louis Public Service Company on May 26 sent 170 checkers into the district bounded by Twelfth Boulevard, Market Street, Third Street and Washington Avenue, to note the kinds of traffic in that section and the volume of such traffic.

Among other things the company wanted to know what part private automobiles play in transportation and whether parked automobiles carry a sufficient number of persons to justify their private-garage use of much-needed street space on the badly congested downtown thoroughfares.

The checkers found that 45,961 automobiles entered the district during twelve hours and carried 72,342 persons, an average of only 1.58 persons per automobile, including the driver. It was found also that 14,693 of these automobiles parked at the curb during some time of the day. Thus it was found that the parking of these private automobiles in the 56 square blocks comprising the congested area accommodates only 23,222 persons. That number was only 10 per cent of the persons who entered the district during the twelve-hour period under observation. In short, 10 per cent of the persons entering the district monopolized about one-third of the downtown street space for the storage of their automobiles. The average parking time of automobiles ranged from 45 minutes on Sixth Street to 1 hour and 40 minutes on Market Street.

In the twelve-hour period, 216,350 persons entered the downtown district and of these the street cars and buses carried 129,819 or 60 per cent. During the rush hours 7 a.m. to 9 a.m., the street cars and buses carried 73.5 per cent of all and the street cars alone 65 per cent. The average street car load was 28.5 persons. The buses carried 15,277 persons into the district and with 693 buses entering the average was 22 persons per bus. Service cars, or jitneys carried 6,528 persons in 1,629 cars or only four persons per vehicle.

The 1,221 street cars and buses entering the district carried four times as many people as the 14,532 private automobiles. The elimination of all parking in the downtown district would save five minutes to street car riders in getting into and out of the congested district. Some downtown business men have been reluctant to advocate the abolition of parking, even on very narrow streets. The traffic check made by the railway dispels the theory that parked automobiles are an aid to retail business downtown.

Checkers, who studied the customers of the city's four large department stores during the day, found the total in excess of 120,000 or about five times the total number carried into the district by all the private automobiles. Few persons who use the downtown streets for private garages are potential customers of the stores in the districts. Most of them are employees of various establishments.

Illumination a Feature

AS an added entertainment feature of the American Electric Railway Association Convention at San Francisco, the local committee of the National Electric Light Association will hold over from the convention of that association the special illumination features in the Civic Center so it will be available for display on Monday evening, June 23, following the A.E.R.A. banquet.

Engineers Report on Transit in Philadelphia

J. A. Emery, chairman, Milo R. Maltbie, W. K. Myers and S. M. Swaab, constituting the transit advisory committee to the general conference on the transit situation in Philadelphia, filed their report on May 24. The document covers 151 pages of typewritten text together with 71 tables. The report deals with the principal facts of the transit situation. The members of the committee do not recommend any specific plans for improvements, nor do they attempt to determine what is preferable, believing their action in this respect to follow the purport of the instructions under which they proceeded.

In the discussion of the various plans they illustrated the financial results under certain assumed conditions. They say that no one can predict what terms might be agreed upon between the city and other parties at interest under any one of these plans without knowing specifically the terms and conditions.

In their discussion they used the financial data reported by the Philadelphia Rapid Transit Company for the year 1929, but did not attempt to analyze, audit, or review the data as such criticism would involve among other things the determination of questions at issue in a judicial proceeding and were considered beyond the scope of the inquiry which the members were instructed to conduct. The members of the committee say that it is impossible at this time to make a satisfactory forecast of earnings of the property largely because of changing economic conditions.

Conway Interests Take Philadelphia & Western Railway

Thomas Conway, Jr., and his associates have assumed control of the Philadelphia & Western Railway and will actively direct the management. The company operates a high-speed suburban system running from the 69th Street Terminal, Philadelphia, to Strafford and Norristown, respectively, passing en route through Ardmore, Haverford, Bryn Mawr, Villa Nova, Radnor, and other communities.

For the purpose of insuring continuity of management and policies, the holders of a majority of the total number of outstanding shares of capital stock of Philadelphia & Western are depositing them under a voting trust agreement extending over a period of years under which Thomas Conway, Jr., William L. Butler, Alba B. Johnson, Edgar C. Felton and C. Jared Ingersoll are named as voting trustees. Mr. Conway has been elected chairman and Mr. Butler vice-chairman of the board. They will be the senior executive officers of the company. No changes in the operating personnel are contemplated. John L. Adams will remain as president, reporting to the chairman and the vice-chairman of the board. Mr. Johnson has been associated with the Conway interests in other electric railway properties.

The plan also contemplates that a large block of stock in the Philadelphia & Western will be acquired by the Conway interests.

In 1922, Mr. Conway and his associates took over the management of the Chicago, Aurora & Elgin Railroad, a high-speed suburban system serving the western suburbs of Chicago. During a period of approximately four years of operation of this property by the Conway interests, gross revenues from railway operation were increased 66 per cent, and net earnings, after operating expenses, maintenance and taxes, more than 150 per cent. In 1926, the control of this company was sold to the Insull interests.

Early in 1926 the Conway interests acquired control of the Cincinnati, Hamilton & Dayton Railway and since that time total operating revenues have been increased 22 per cent and net earnings more than 230 per cent. On Jan. 1, 1930, four other electric railway properties were acquired and the name of the company changed to Cincinnati & Lake Erie Railroad, now one of the largest interurban railway systems in the United States.

The Conway interests, through the Thomas Conway, Jr., Corporation, are the developers of Drexel Park, one of Philadelphia's most beautiful suburbs.

◆

Segregation of Ohio Light and Railway Properties

Stockholders of the Pennsylvania-Ohio Power & Light Company, Northern Ohio Power & Light Company, the Ohio Edison Company, the Akron Steam Heating Company, and the London Light & Power Company, all operating in Ohio and owned by the Commonwealth & Southern Corporation, have been informed that the directors of these companies are of the opinion that to consolidate them, thus uniting the electric light, power and steam heating business into one company and to separate the transportation portion of their properties into subsidiary units, will result in increased efficiency and economy of operation and create an electric company with a greater diversity of consumer use than is now possessed by any one of the individual companies. Accordingly a new company will be formed to be known as the Ohio Edison Company, which will also acquire the physical assets of Ohio River Edison Company and the Ohio River Transmission Company, which companies own the power plant and transmission lines now leased to the Pennsylvania-Ohio Power & Light Company. It is also proposed to convey the transportation portion of the the property of these companies to three separate companies, retaining the consolidated company's equity in them through stock ownership.

◆

Milwaukee Rate Case Under Way

The suburbs of Milwaukee were authorized to intervene in the appeals of the city and the Milwaukee Electric Railway & Light Company from the Railroad Commission's recent street car rate order by Circuit Judge Zimmerman on June 9, at a hearing for preliminary motions in the case at Madison. Trial of the appeals was set for June 18.

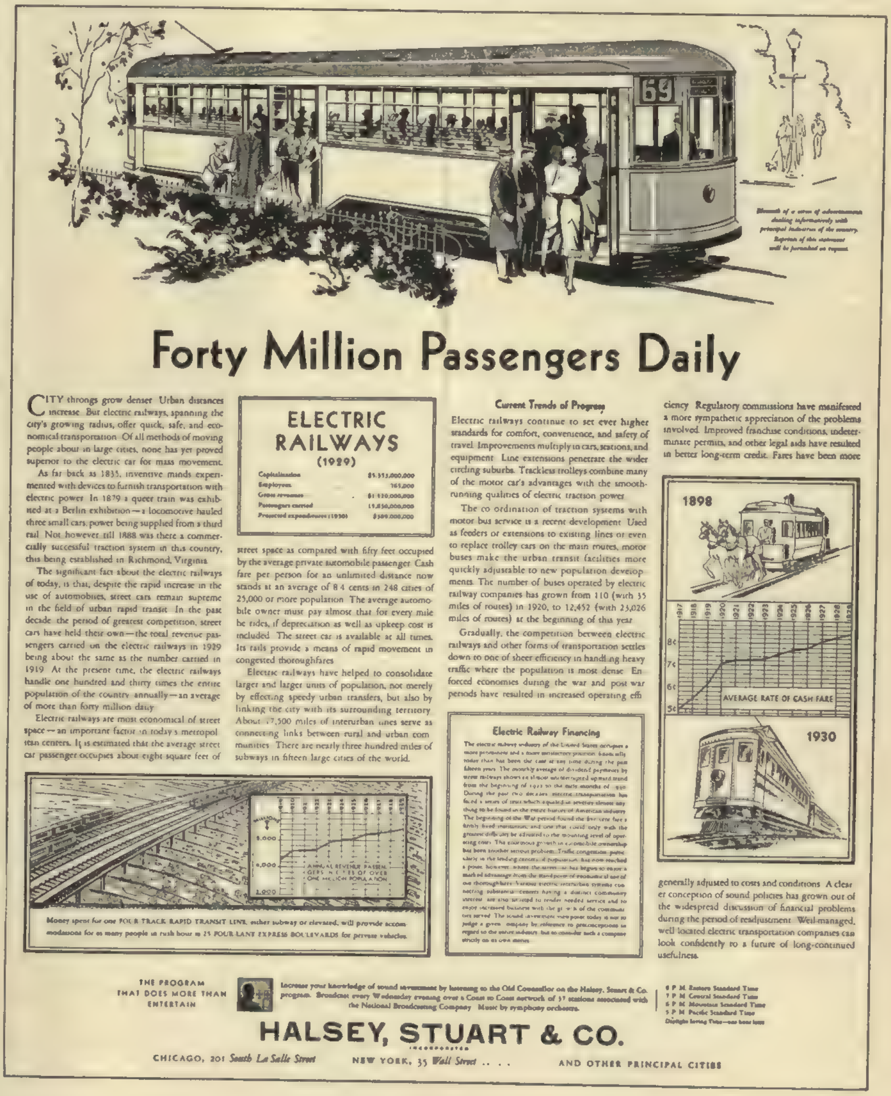
Judge Zimmerman also granted the company's plea that its appeal and that of the city be consolidated for purposes of trial. City Attorney Niven said he would not oppose consolidation of the cases if it was understood that the cases were to be presented separately at the same trial.

Nine suburban communities were represented at the trial. The city and the company are appealing from the commission's order as inequitable. The commission, which will be defendant at the trial, was represented by the assistant attorney general at the first trial. The suburbs and other outlying districts, which stand to gain from the commission's order, are intervening to defend the order.

◆

Effective Banker Co-operation

Co-operation from an unusual source in the campaign of the electric railway industry to impress the public with the importance and value of the electric railways is reflected in the accompanying advertisement which appeared over the signature of Halsey, Stuart & Company in the *United States Daily* on May 28, 1930. This advertisement is one of a series dealing informatively with the principal industries of the country. The purpose back of the advertisement was to have it serve as an effective reminder of the important place which the electric railways play in the present transportation system.



Eleventh of a series of advertisements dealing informatively with principal industries of the country. Reprints of this statement will be furnished on request.

Forty Million Passengers Daily

CITY throngs grow denser Urban distances increase But electric railways, spanning the city's growing radius, offer quick, safe, and economical transportation Of all methods of moving people about in large cities, none has yet proved superior to the electric car for mass movement.

As far back as 1835, inventive minds experimented with devices to furnish transportation with electric power In 1879 a queer train was exhibited at a Berlin exhibition—a locomotive hauled three small cars, power being supplied from a third rail Not however till 1888 was there a commercially successful traction system in this country, this being established in Richmond, Virginia

The significant fact about the electric railways of today, is that, despite the rapid increase in the use of automobiles, street cars remain supreme in the field of urban rapid transit In the past decade the period of greatest competition, street cars have held their own—the total revenue passengers carried on the electric railways in 1929 being about the same as the number carried in 1919 At the present time, the electric railways handle one hundred and thirty times the entire population of the country annually—an average of more than forty million daily

Electric railways are most economical of street space—an important factor in today's metropolitan centers. It is estimated that the average street car passenger occupies about eight square feet of street space as compared with fifty feet occupied by the average private automobile passenger Cash fare per person for an unlimited distance now stands at an average of 8 4 cents in 248 cities of 25,000 or more population The average automobile owner must pay almost that for every mile he rides, if depreciation as well as upkeep cost is included The street car is available at all times. Its rails provide a means of rapid movement in congested thoroughfares

Electric railways have helped to consolidate larger and larger units of population, not merely by effecting speedy urban transfers, but also by linking the city with its surrounding territory About 17,500 miles of interurban lines serve as connecting links between rural and urban communities There are nearly three hundred miles of subways in fifteen large cities of the world.

ELECTRIC RAILWAYS
(1929)

Capitalization	$5,515,000,000
Employees	165,000
Gross revenues	$1,110,000,000
Passengers carried	15,850,000,000
Projected expenditures (1930)	$580,000,000

Current Trends of Progress

Electric railways continue to set ever higher standards for comfort, convenience, and safety of travel Improvements multiply in cars, stations, and equipment Line extensions penetrate the wider circling suburbs. Trackless trolleys combine many of the motor car's advantages with the smooth-running qualities of electric traction power

The co ordination of traction systems with motor bus service is a recent development Used as feeders or extensions to existing lines or even to replace trolley cars on the main routes, motor buses make the urban transit facilities more quickly adjustable to new population developments. The number of buses operated by electric railway companies has grown from 110 (with 35 miles of routes) in 1920, to 12,452 (with 23,026 miles of routes) at the beginning of this year

Gradually, the competition between electric railways and other forms of transportation settles down to one of sheer efficiency in handling heavy traffic where the population is most dense Enforced economies during the war and post war periods have resulted in increased operating efficiency Regulatory commissions have manifested a more sympathetic appreciation of the problems involved. Improved franchise conditions, indeterminate permits, and other legal aids have resulted in better long-term credit. Fares have been more generally adjusted to costs and conditions A clearer conception of sound policies has grown out of the widespread discussion of financial problems during the period of readjustment Well-managed, well located electric transportation companies can look confidently to a future of long-continued usefulness.

Money spent for one FOUR TRACK RAPID TRANSIT LINE, either subway or elevated, will provide accommodations for as many people in rush hour as 25 FOUR-LANE EXPRESS BOULEVARDS for private vehicles.

Electric Railway Financing

THE PROGRAM
THAT DOES MORE THAN
ENTERTAIN

Increase your knowledge of sound investment by listening to the Old Counsellor on the Halsey, Stuart & Co. program. Broadcast every Wednesday evening over a Coast to Coast network of 37 stations associated with the National Broadcasting Company Music by symphony orchestra.

8 P M Eastern Standard Time
7 P M Central Standard Time
6 P M Mountain Standard Time
5 P M Pacific Standard Time
Daylight Saving Time—one hour later

HALSEY, STUART & CO.
INCORPORATED

CHICAGO, 201 *South La Salle Street* NEW YORK, 35 *Wall Street* . . . AND OTHER PRINCIPAL CITIES

Display Ad Emphasizing Importance of the Electric Railways

LATE NEWS

(*Continued from Page* 422)

Cleveland, Ohio — The department store for which the Van Sweringen interests made provision in their Cleveland Union Terminal group will be occupied by the Higbee Company, in business 70 years. The store will be built at the intersection of Ontario Street and the south roadway of the Public Square, above the rapid transit tracks and terminal. Construction contracts are to be let immediately.

◆

Utica, N. Y.—Segregation of earnings of the various units of the New York State Railways as urged by holders of mortgage bonds covering the Syracuse and Rochester units and opposed by holders of bonds on the Utica lines, is under consideration by Judge Bryant of the United States Court.

◆

Tacoma, Wash. — Representatives of Titlow Beach and the far west end of the city have thus far failed to convince Tacoma Railway & Power Company officials that there is enough business out Sixth Avenue beyond Proctor Street to warrant the company putting in a bus service at regular city fares. Commissioner Davisson suggested that the company institute a 90-day trial of the bus line.

◆

Davenport, Iowa—Dissolution of the Tri-City Railway & Light Company of Davenport, Iowa; Rock Island and Moline, Ill., to simplify the financial structure of the United Light & Power Company will be voted upon June 19 at a special meeting of stockholders. Direct control will be placed with the United Light & Power Company by the elimination.

◆

San Francisco, Cal.—Officials of the Southern Pacific Company have announced that hereafter special permits will be issued to blind persons accompanied by "seeing eye" dogs giving them the right to use any of its trains carrying coaches, in club cars of Pullman trains, on the upper deck of ferry steamers and on electric trains.

◆

Concord, N. H. — Robert J. Dunn, who operates a bus company under the name of the Yellow Cab Company here, has been authorized to operate a line between Concord and London, N. H., via the Concord airport. At the Public Service Commission hearing on the matter, the petition was opposed by the Boston & Maine Transportation Company and the Concord Street Railway. The latter's rights are protected in the decision of the commission by a clause that forbids the Yellow Cab Company to take on passengers on any streets where the railway holds franchise rights.

◆

Nashville, Tenn. — Hiram A. Davis, superintendent of the railway department of the Nashville Railway & Light Company, is dead.

◆

New York, N. Y.—In a letter to President Hedley of the Interborough Rapid Transit Company, the Transit Commission has declined to hold a hearing on its proposal to issue $40,000,000 additional first and refunding bonds to finance purchase of additional cars ordered by the commission on April 30. The commission holds the company should amend the petition to conform with the commission's wishes.

◆

New York, N. Y.—More than 85 per cent of the replies received by the Interborough Rapid Transit Company in its poll of passengers on the Sixth Avenue "L" favor retaining this line until it is replaced by a subway on Sixth Avenue, according to a summary made public by the company. In answer to the question, "Do you want the Sixth Avenue 'L' kept in operation until the proposed city subway under Sixth Avenue is in operation?" the following replies have been tabulated: Yes, 12,136; no, 2,085.

◆

St. Louis, Mo.—The Missouri Public Service Commission has approved the plan for the St. Louis Public Service Company and the Peoples' Motor Bus Company to interchange transfers for the convenience of patrons of the St. Louis Municipal Opera, which opened a twelve-week season at the Open Air Theatre in Forest Park on May 30.

◆

New York, N. Y.—Supreme Court Justice Levy has granted the city's application for removal of Interborough Rapid Transit Company's elevated spur in East 34th Street. At present, one-car shuttle train, carrying an average of 140 passengers a day is operated over line.

◆

East St. Louis, Ill.—The City Council has adopted a resolution opposing the application of the East St. Louis Railway for a straight 10-cent fare for adults. Cash fares now are 10 cents but five tokens are sold for 40 cents.

◆

Louisville, Ky.—Director of Works Will has approved the application of the Louisville Railway to abandon the Brook and West Main line, the Bank Street line and the Jefferson Street line west of Seventh Street. Mr. Will has also approved the rerouting of the Portland Street line, the inauguration of a bus route in Portland and a rerouting of the Preston and Main Street line. The changes will be put into effect within 60 days.

◆

St. Augustine, Fla.—Authority has been granted the city of St. Augustine and the St. Augustine Company, controlled by the Florida Power & Light Company, for abandonment of the railway here in an order issued by the Railroad Commission. The line runs from just east on the Matanzas River bridge across Anastasia Island for a distance of 4.8 miles. The commission said its right was not "exclusive and complete," but that it would be for the best interest of the applicants and the public.

◆

St. Louis, Mo.—The St. Louis Public Service Company has been requested to substitute iron for wooden trolley poles from Olive Street between Twelfth Boulevard and Channing Avenue. A recent experiment of suspending trolley wires from the concrete light standards on Olive Street just west of Twelfth Boulevard indicated that these poles were not sufficiently strong to sustain the additional weight.

Brooklyn, N. Y.—The valuation basis to be used in fixing the price to be paid by New York City for elevated lines of the Brooklyn-Manhattan Transit Corporation continues to be one of the main stumbling blocks in the way of unifying the company's rapid transit lines with the city's new subway system, it developed at a conference of city and state transit officials.

◆

Milwaukee, Wis. — Latest appraisals of the estate of John I. Beggs, long president of the Milwaukee Electric Railway & Light Company, place its value at $54,800,000.

◆

Anderson, Ind.—Receivership proceedings of the Union Traction Company were advanced in Madison County Circuit Court on June 6 when Judge Carl F. Morrow entered a decree with an order to the receiver to sell all property of the company at auction here on July 2. Through deals made direct with bondholders, the Insull interests in the last year have a contract to buy more than 60 per cent of the outstanding bonds of the Union Traction system, and with these in their possession will be in an advantageous position as prospective purchasers.

◆

Chicago, Ill.—First prize in the electric railway posters and cards division competition of the Public Utilities Advertising Association was won by the Chicago Rapid Transit Company.

◆

Manchester, N. H.—The Manchester Street Railway, now being operated by the Public Service Company of New Hampshire, celebrated the 35th anniversary of the electrification of the road on June 8. Officials of the company and city government leaders rode on a new 44-passenger trolley over the route followed by the first car 35 years ago.

◆

New Haven, Conn.—Employees of the Connecticut Company have agreed to a renewal of the present wage scale for one year from June 1. Operators of cars and buses, shop workers and power house men are included. Recently the men, through their executive committee, asked for an increase and changed working conditions. Following conferences it was decided to vote again with the result that the former scale has been renewed.

◆

New York, N. Y. — Additional testimony has been furnished the Mayor's Taxicab Commission favoring a limit on the number of cabs and an increased fare, by Ernest H. Miller, president of the Parmelee Transportation Company, who urged the adoption of a uniform rate of 25 cents for the first quarter mile and 5 cents for each succeeding quarter. He also urged the number of cabs be limited to 15,000.

◆

Alexandria, Va.—The two Alexandria transportation companies, after succeeding on May 13 in a plea for increased fares to become effective on June 10, withdrew their application for the increase before the State Corporation Commission on June 5. The fare was to have been 8 cents. The communication from the companies stated that a decision had been reached "to give the intrastate rates heretofore existing a further trial, hoping that the operation may be continued without the necessity for any increase."

(*Late News Continued on Page* 426)

More Convenient Service by Bus in Schenectady

The Public Service Commission has authorized the Schenectady Railway to operate buses in place of cars on the Rosa Road-Nott Street-Erie Boulevard line and the Crane Street line. The city authorities have consented.

Buses on the Crane Street line will be used on practically the same route over which cars now operate and they will also pass through certain streets not now served by the trolley line. The Rosa Road line will supplement existing trolley lines and serve a section of the city not now conveniently reached by the trolley cars. Transfers are to be exchanged between the trolley cars and the buses.

The bus service on the Crane Street line will provide through service from the Mount Pleasant section to the General Electric Works and an alternate route is provided over the Crane Street line so that special shop trips can be made over a more direct line, thereby saving about twelve minutes over present operation. There will be a ten-minute headway and four buses will be used.

The Rosa Road line will furnish service to residents of that section now required to travel at least two blocks to the Grand Boulevard line. This will afford a more direct and time saving trip between that section and the American Locomotive and the General Electric plants.

◆

City and Railway Differ About Madison Fares

Officers of the Madison Railways and city officials have clashed over the proposal by the city that the company try a $1 weekly pass in the hope of increasing its revenue. The company wants a straight 10-cent cash fare and a fare of 5 cents for school children. The present schedule is 10 cents cash, 16 tokens for $1, three for 25 cents and a 5-cent fare for school children.

At the hearing before the Railroad Commission on June 9 Dudley Montgomery, vice-president and general manager of the company, declared that if a weekly pass were substituted for the sale of tokens the passenger revenues would still further decrease. City Attorney Lewis insisted that the company should at least try the pass. City officials contend that a further increase in fares will tend to drive patronage away. The hearing may not be resumed until July.

◆

Separation of Suburban from Through Traffic

In its great Philadelphia station project, the Pennsylvania Railroad is planning to separate to a very large extent the suburban from the through traffic. The through traffic trains will all be handled at the main station, so constructed as to allow trains to go to or from the East, West, South or North, without reversing direction, as is now required. Suburban trains, serving territory within 30 miles of Philadelphia west of the Delaware River, will all stop at the main station, but they will then continue on about a mile further to a new underground suburban station which is being specially constructed at Sixteenth Street and the Parkway, close to the long-established downtown business center. An overwhelming proportion of the commuters and frequent riders on these trains will use the underground station, while only a few will get on or off at the main station. Thus, the principle of separation or segregation, as between short distance and long distance travel, will be applied on a larger scale to a great railroad terminal project.

◆

N.E.L.A. Delegates Leave New York

Headed by Matthew S. Sloan, president of the National Electric Light Association, who is also president of the New York Edison and affiliated electric companies, 210 members of the National Electric Light Association left the Pennsylvania station in New York on June 12 on a special train known as the "Blue Special" for the Pacific Coast, where they are scheduled to arrive June 15, the day before the 53rd annual convention of the association will begin.

◆

Buses to Replace Rochester-Buffalo Railway Service

The Public Service Commission has granted the application of the Rochester, Niagara Falls & Buffalo Coach Lines, Inc., for certificates for operation of bus lines between Rochester and Buffalo and between Rochester and Niagara Falls.

The new company was organized in the interests of the Rochester, Lockport & Buffalo Railroad. The trolley operates 54 miles between Rochester and Lockport, running thence over the International tracks to Buffalo, carrying freight and passengers. The coach company is to be financed by the railroad and it will operate four buses at the outset, two between Rochester and Buffalo and two between Rochester and Niagara Falls. This number will be increased as service demands. It was stated at the hearing that due to competition with private automobiles, expense of grade crossing eliminations, signal installations, which it anticipates, together with possible paving costs in villages the railroad can not continue operation, and for that reason it organized the coach company. The company's petition amounts to a gradual substitution of bus service for trolley service between Rochester and Lockport and extension of the bus route from Lockport into Buffalo.

The company's petition to operate between Lockport and Buffalo was opposed by the Western New York Motor Lines, the Buffalo Transit Company and the International Railway. The Western New York line claimed the operation would be in direct competition with its buses between Rochester and Buffalo, but this contention, the commission holds, is not sustained by the facts. The Buffalo Transit Company claimed that there was adequate service between Lockport and Buffalo. The commission finds that the two lines would parallel for about 13 miles between Lockport and Sheridan Drive, but the new company is to be restricted and no passengers are to be carried boarding cars in either city for transportation to or from Lockport or Buffalo. The International Railway said that transportation facilities between Buffalo and Lockport are entirely adequate.

New Diesel Bus Tested

Some 40 bus operators and press representatives including one from Electric Railway Journal were guests of the Mercedes-Benz Company on June 11 at a demonstration and test of a Diesel-engine powered bus just received from the German factory of the company. The bus was operated on a run of about 30 miles at varying speeds in traffic. Its performance appears to be approximately equal to that of a gasoline bus of equal size and motor rating. Control of the vehicle is through a standard gear set and accelerator pedal. Low-grade fuel oil was used. The exhaust appeared practically clear and odorless.

The power plant consists of a six-cylinder Diesel engine with bore of $3\frac{15}{16}$ in. and stroke of $5\frac{29}{32}$ in. The weight is 1,400 lb. At the maximum speed of 1,650 engine r.p.m., the rating is 72 hp. The fuel is supplied to the cylinders by the usual fuel pump and through injection nozzles, and is fired by the heat generated during compression of the engine. To start, a storage battery operated starting motor of conventional type is used with an electric preheater warming "glow plugs" in the ignition chamber to create the necessary temperature for the initial explosions.

The engine has two blocks of three cylinders each, and the crankshaft is of the seven-bearing type and carries a vibration damper. The rods are of steel of double T section, while the pistons are of aluminum alloy. In the cylinder heads are an inlet and an exhaust valve of the overhead type for each cylinder, the fuel injector nozzle and the pre-combustion chamber. The valve mechanism is driven by push rods and rocker arms from the camshaft through helical gears. The water circulation system in similar to that in general use with gasoline engines for bus service.

It is stated that the engine and vehicle are now in production for sale in the American market. The National Railway Appliance Company of New York is the sales agent for the United States.

◆

Detroit's Trackless Trolley To Be Fittingly Installed

Ceremonies befitting the occasion are planned for the opening by the Department of Street Railways, Detroit, Mich., on June 16 of service by trolley bus over a route of more than 5 miles on Plymouth Road between Grand River Avenue and the city limits. It is expected that Henry Ford will be among the prominent citizens who will attend. The city recently ordered six trackless trolleys from the Twin Coach Corporation.

◆

H. L. Miller in New Post

H. L. Miller, has accepted a position with the Pettibone Mulliken Company as manager of electric railway division. Mr. Miller studied civil engineering at Bucknell University and joined the Engineering Corps of the Pennsylvania Steel Company, Steeton, Pa., on construction and plant maintenance in 1905, entering the frog and switch department of the company in 1907, resigning this latter position in 1910 to accept a position as draftsmen with The Buda Company at Harvey, Ill., with which he served continuously until March of this year. At the time of his resignation he held the position as chief engineer.

Trolley Buses for Queens

The Brooklyn & Queens Transit Corporation will ask the Board of Estimate for authority to replace some of its trolleys in the Borough of Queens with trolley buses. Officials of the company, promising closer co-operation with the Queens Highway Bureau, have agreed to aid in the shifting of the tracks on Corona and Way Avenues, Woodhull Street, Flushing Avenue and Metropolitan Avenue.

President Menden said he believed the most feasible plan is to substitute trolley buses for trolleys, so as to permit the removal of tracks from main thoroughfares. This would expedite traffic and would result in lower operating expenses for the company. The company plans to try out the trolley buses on the Junction Avenue route in Corona.

Accident Record Bettered in Kansas City

Four classes of accidents were reduced by the Kansas City Public Service Company, Kansas City, Mo., during 1929. Fell-in-car accidents were lower than they have been for four years. Collision-with-person accidents were reduced to the lowest point in seven years. Car collisions have been lowered more than 50 per cent in the last four years. The blind accident record showed an improvement. Vehicle collisions showed no improvement. Boarding and leaving accidents, and those involving injury by gates and doors, all increased. Two hundred and seventy-seven car and coach operators went through the entire year without an accident that was avoidable. Prizes given by the company are considered largely responsible for improvements in the accident record.

Yellow Coach Reports Best Month in History

General Motors Truck reports Yellow Coach deliveries for May as the largest in the history of the company, deliveries for the month amounting to more than $3,500,000. This sum represents sale of 403 buses, mostly of the large capacity type. The total compares with deliveries valued at $1,535,000 for the corresponding month of last year. Increased sales as reported are due to large orders recently secured from Public Service Co-ordinated Transport, the Greyhound System, Fifth Avenue Coach and other prominent motor coach operators. Coaches ordered and scheduled for delivery in June compare favorably with totals for May.

LATE NEWS

(*Continued from Page* 424)

Chicago, Ill.—The popularity of the service on Diversey Avenue has necessitated an increase in the number of buses originally planned by the Chicago Surface Lines on streets in the northwest section. More buses have been ordered and the installation of service on other streets covered by the order of the Commerce Commission will begin at once. Trolley bus service on Central Avenue, from Lexington Street to Milwaukee Avenue, was started on June 8. The streets, in addition to Diversey and Central Avenues, on which trolley bus service is to be installed are as follows: Narragansett Avenue, North Avenue, Elston Avenue. Belmont Avenue is being supplied with service by means of gasoline buses. Gasoline bus service also will be established on Irving Park Boulevard from Neenah to Harlem Avenue.

◆

New York, N. Y.—The *Financial World* for June 11 is the eighteenth annual public utility review. In addition to an analysis of more than 150 utilities, the issue contains articles entitled: "Forecasting Electrical Growth"; "The Growing Natural Gas Industry"; "Valuing Public Utility Securities"; "Ventures Into Foreign Fields"; "A Study of Utility Holding Companies," and "Analyses of More Than 150 Utilities."

◆

Detroit, Mich.—Recall petitions seeking to remove a mayor from office are being circulated for the first time in Detroit's history. Charles Bowles is the mayor. He was elected last fall to succeed Mayor Lodge on a platform calling for the quick and thorough cleaning up of the city. Now he faces removal on charges that he has permitted Detroit's underworld to ply its illicit trade openly. Another factor in the recall movement was Mayor Bowles' recent dismissal of Frank Couzens, son of Senator Couzens, from the street railway commission in charge of Detroit's municipal railway. The commission, composed of three men, recently voted to increase fares. Mr. Couzens protested vigorously.

◆

Portland, Ore.—Proposal of the Pacific Northwest Public Service Company to extend its 10-cent car zone to nearby points on its three main interurban electric lines and extend full transfer privileges has been discussed by company officials with members of the public service commission. Members of the commission pointed out that Milwaukie residents now riding on the fixed terminals plan will have to pay 10 cents from Milwaukie to First and Alder Streets instead of 7 cents as at present, but the company officials said that under the 10-cent zone plan a Milwaukie resident could ride to any point in Portland for the dime, whereas now, because of the fact that no transfers are granted at this fare, he would have to pay 17 cents.

◆

Greenville, S. C.—The Piedmont & Northern Railway has presented motions in Federal Court here asking that parts of the bill of complaint in the suit of the Interstate Commerce Commission and a group of steam railways against the electric line be stricken out. The commission and steam railways seek to secure an injunction against the $15,000,000 expansion program of the Piedmont & Northern. The case will be tried on its merits in Federal Court during the summer. The Piedmont & Northern is planning immediate resumption of work on the Spartanburg-Gastonia link.

Rockaway, N. Y.—Twenty-two municipally owned buses have been put in operation by the Department of Plant and Structures between Far Rockaway and Neponset, Queens. Soon after municipal operation started the police ordered off the streets all buses of eight non-licensed lines. The present arrangement will continue until satisfactory plans can be outlined for a permanent system. Mayor Walker has indicated that the general report on the bus situation soon to be submitted by the Board of Transportation would clarify the Rockaways problem.

◆

Boston, Mass.—The trustees of Eastern Massachusetts Street Railway took no action on June 10 on the quarterly dividend of $1.25 on adjustment stock due at this time.

◆

New York, N. Y.—The Transit Commission's suit to compel the Interborough Rapid Transit Company to live up to the 5-cent fare requirements of its contract with the city on subway and elevated lines and the company's litigation for a 10-cent fare on its elevated routes will make no further progress until fall. Both suits have yet to reach the Appellate Division calendar and that court is about to adjourn.

◆

Toronto, Ont.—Their names referred back twice without discussion and rejected entirely by the City Council at a special meeting, W. C. McBrien, former Comptroller Albert Hacker and S. J. McMaster, have been renominated by the Board of Control as Toronto Transportation Commissioners. The feeling prevails that some members of Council who voted against the recommended Commission will now change their votes. When the Board of Control met it decided not to name the commissioners, but later reconsidered its decision, and after several fruitless attempts to select other commissioners from names already suggested to it, renominated its rejected selections.

◆

Laconia, N. H.—The Laconia Car Company has voted to pay a liquidating dividend of $10 to preferred stockholders.

◆

Huntington, W. Va.—No further opposition by the city or business interests to rate increases sought by the Ohio Valley Electric Railway is planned upon the showing of the statistician's report civic and business leaders voted favorably on a resolution favoring relief for the railway and voiced their accord with any decision of the Public Service Commission.

◆

Winnipeg, Man.—An early decision regarding the application of the Winnipeg Electric Company for an increase in fares and relief from certain tax imposts, is indicated in the report of the auditors appointed by the City Council to examine the company's books. This report has been presented to the special committee of the City Council. Representatives of the company were present when the report was read to the committee, but a copy was not then available to the company. Despite this, company officials feel that the findings establish the fact that the company is entitled to relief much greater than it asked, and that the report confirms the facts set out in the company's application.

PEACE
in motormen's minds
GOODWILL
to the public when cars have

PEACOCK STAFFLESS BRAKES!

Motormen can banish the fear that an emergency can bring. They know they have guaranteed safety. They know they can maintain schedules without accidents.

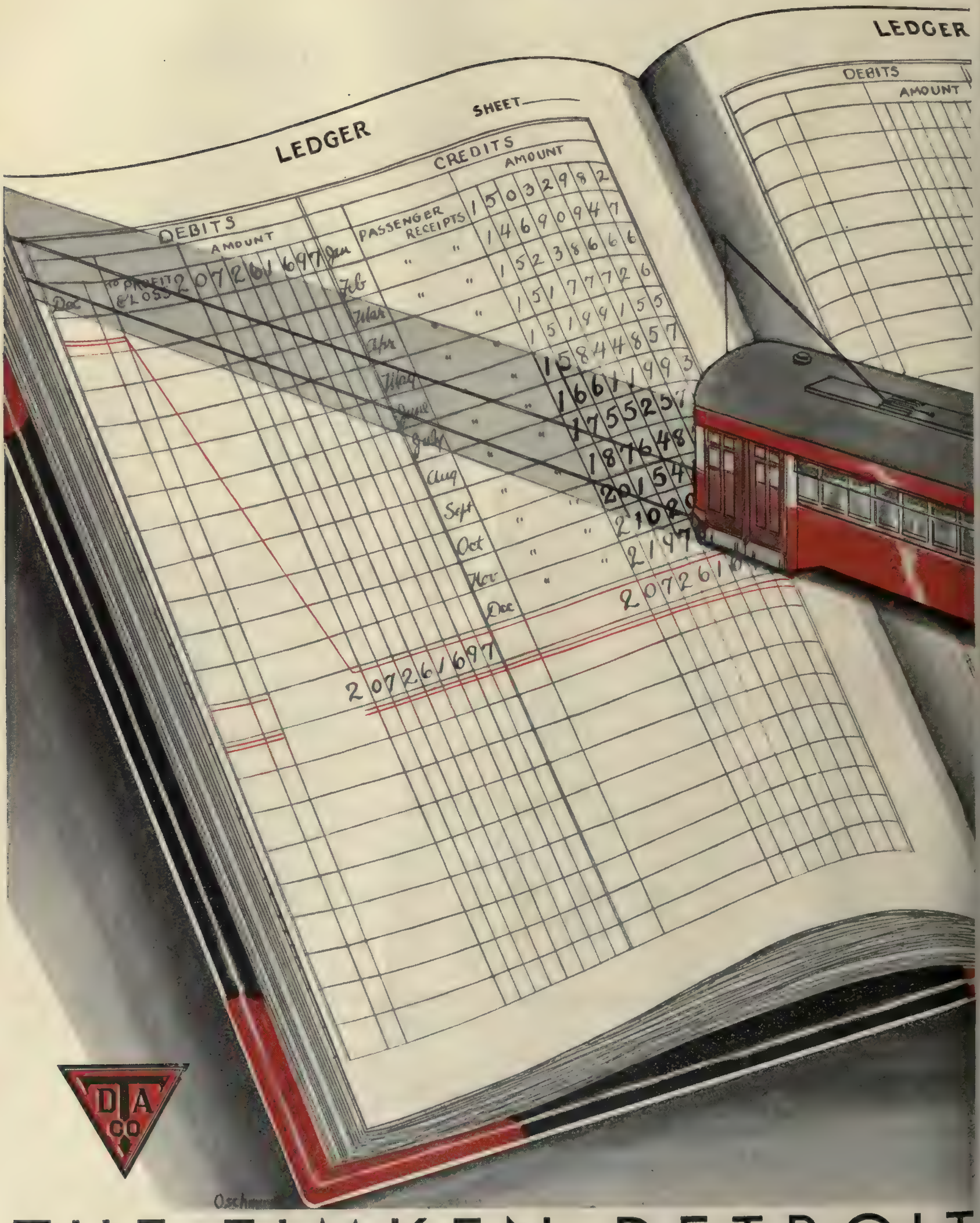
Any thoughtfulness directed toward the public brings dividends. Avoided accidents — and safety not only to those who ride, but to those on the street are worthwhile insurance.

National Brake Company, Inc.

890 Ellicott Square Buffalo, N. Y.

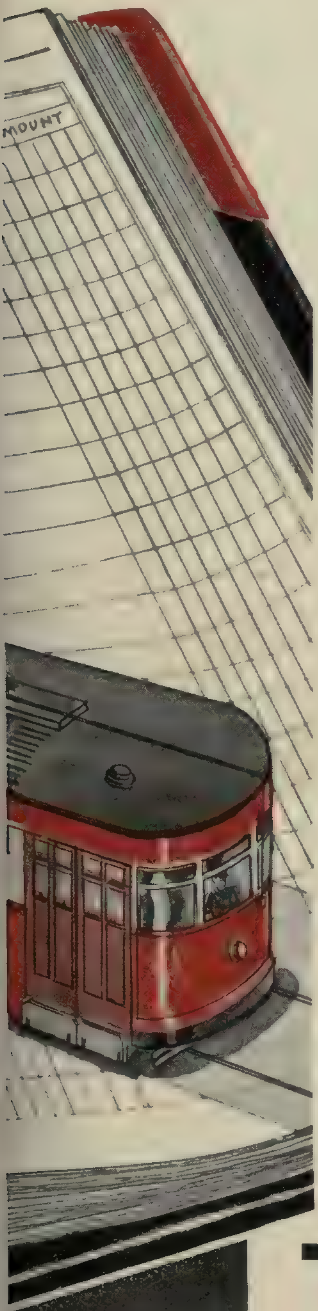
Canadian Representative:
Lyman Tube & Supply Co., Ltd., Montreal, Can.

Make those



THE TIMKEN DETROIT

black figures bigger and blacker



You improve the quality of the product you sell, and cut your cost of doing business by putting Timken Worm Drive Trucks under your cars.

Timken Worm Drive brings street cars into the front rank of quiet, swift dependable transportation.

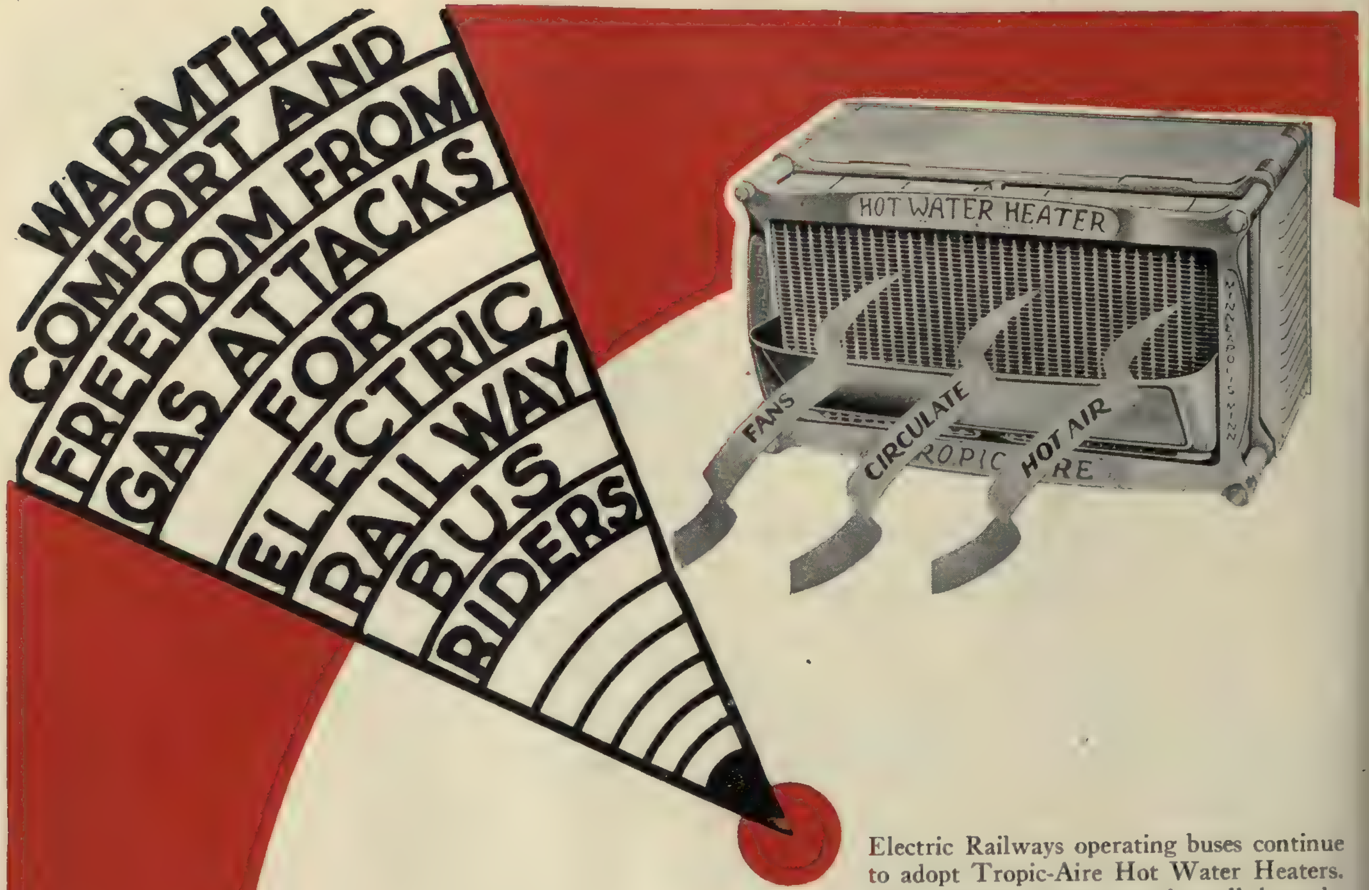
Timken Worm Drive reduces weight; lowers maintenance costs; cuts power consumption; speeds up schedules.

Timken Worm Drive is logical.

American Electric Railway Association
San Francisco, June 23rd to 26th
Headquarters—Hotel St. Francis

TIMKEN
worm drive
TRUCKS
for electric railway cars

AXLE CO., DETROIT MICH.



Electric Railways operating buses continue to adopt Tropic-Aire Hot Water Heaters. This growing acceptance is well brought out by the Public Service Co-ordinated Transport of Newark, N. J. This is America's largest bus operation and they have more than 2000 buses all equipped with Tropic-Aire Hot Water Heaters.

Hot Water heat gives you the one type of heat that is instantly approved by passengers. Tropic-Aire Heaters are a part of the water circulating system. They furnish a sufficient supply of clean, pure air at all times, even when the motor is idling, and for a long time after the engine is stopped.

Tropic-Aire Heating Systems are installed without the usual excessive exhaust piping and valves. They weigh only 45 pounds each, completely installed. This heating system is easily installed and there is practically no maintenance expense.

"Specify Tropic-Aire Heaters on your next order."

TROPIC-AIRE, Inc.
60 Eleventh Ave., N. E.
MINNEAPOLIS, MINNESOTA
Patent Numbers, 1,581,761 — 1,668,491, R. E. 17131, others pending.

TROPIC-AIRE

HOT WATER BUS HEATERS

No. 8M5 Special

No. 327-M Special

No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

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516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

to attract passengers

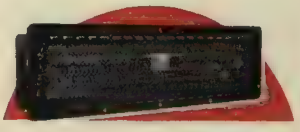
MODERNIZE

Car-riders appeal is enhanced by Comfort and Convenience

INVITE more passengers by heating and ventilating your cars comfortably with modern equipment.

You may also learn how to save otherwise wasted heat by investigating Consolidated modern heating equipment.

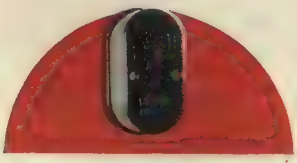
Investigate this possibility in connection with Consolidated equipment for trolleys, trolley-busses and busses.



PARKING is becoming more and more a problem to your potential passengers.

Are you taking advantage of this condition by making your service as convenient and modern as possible.

The only apparatus in your equipment which your passengers operate is the signal system. Does it make a good impression? Consolidated equipment does. Is it modern? Consolidated equipment is.



NEW YORK
ALBANY
CHICAGO

CONSOLIDATED

your cars & busses

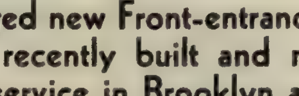
Operating Economy is obtained by using Modern Equipment

WITH a background of a quarter of a century's experience in design and manufacture of Door Operating Equipment ... Consolidated equipment has been modernized and simplified and requires a minimum amount of piping and wiring.

Increasing safety, speed and service invites passengers and increases earnings. Consolidated pneumatic door operating equipment can aid you in attaining and coordinating these factors.

Two hundred new Front-entrance, Center-exit Cars, recently built and now being placed in service in Brooklyn and Cleveland are equipped with Consolidated door operating equipment . . . including Automatic Electric Treadle Control for the Exit-doors.

Why not consider the complete line of Consolidated Modern Door Operating Equipment for your Rapid Transit Cars... Trolley Cars... Trolley Busses... Gas Electric Busses and Gas Busses?



CAR-HEATING CO., INC.

Back of every topic at the A.E.R.A.

The transportation industry is growing—new problems of design, speed and maintenance constantly confront it. At the A. E. R. A. convention these problems (some of which are listed on the opposite page) will be discussed by operating managers and engineers.

There is one factor common to each of these problems confronting the industry. It is *lubrication!*

New engine designs, higher speeds, decreased maintenance costs depend upon quality lubrication for success. For years Cities Service lubricants have assisted in the progress of the transportation industry.

Cities Service engineers are experts on transportation problems because Cities Service itself operates a fleet of more than 4000 motor vehicles of every kind. It has had many lubrication problems of its own —and has *solved them!* Cities Service experts have studied and assisted in the development of the industry since its birth. They have designed and produced oils and greases that have constantly kept pace with the stricter demands placed on lubrication by advanced principles of transportation.

A member of the Cities Service staff of engineers will gladly study and discuss your lubrication problem, giving you the benefit of this billion dollar organization's years of lubrication experience.

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Topic 1. Improving Design to improve transportation Service.

2. Increasing Speed of Operation.

3. Reducing Vibration and Noise.

4. Improving the Riding Qualities of Trucks.

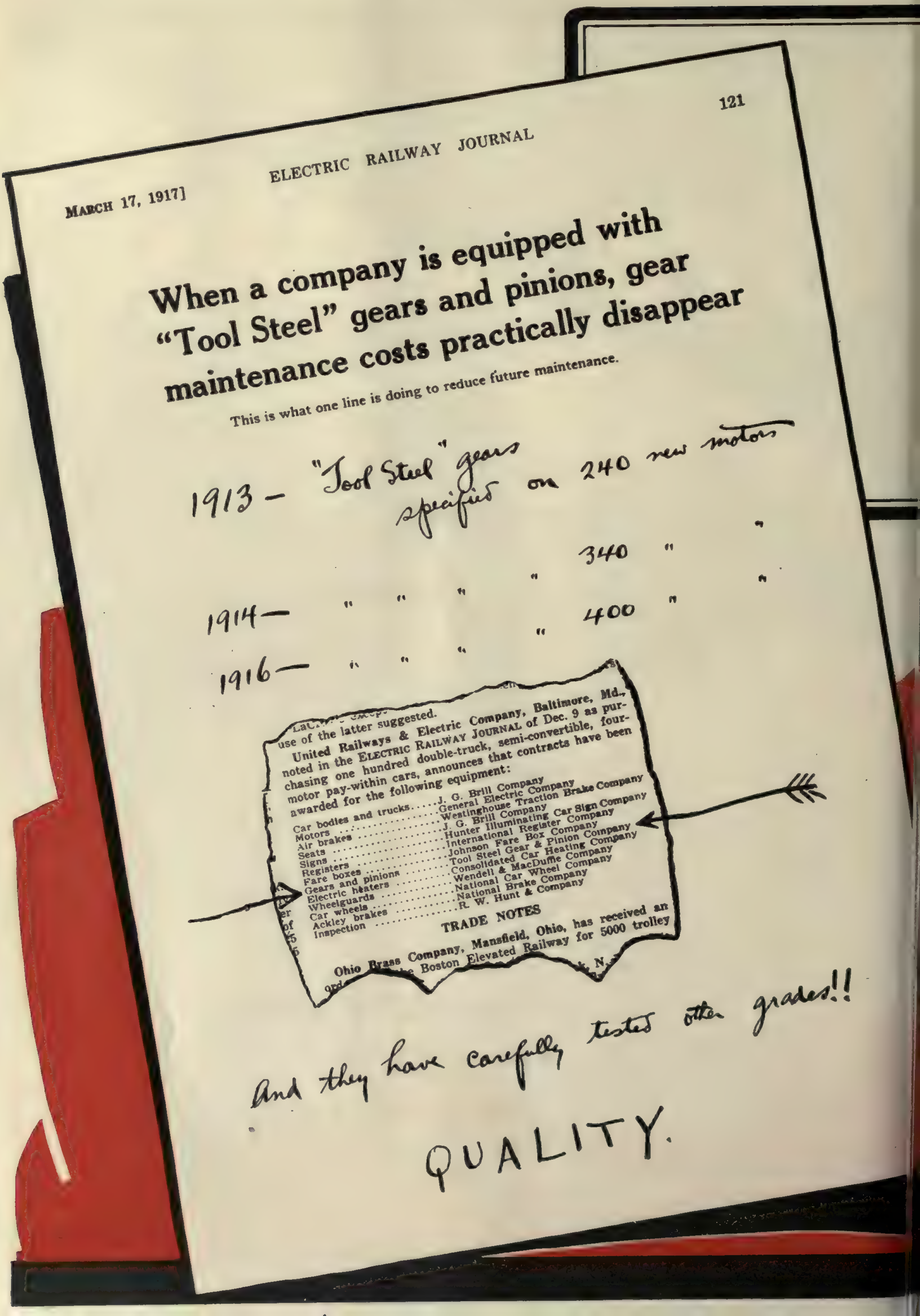
5. Progress in Trolley Bus Design.

6. Meeting the Power Demand.

7. Improving the Bus to increase its Usefulness.

8. Advancement in Structural Design of Vehicles.

9. Increasing the Efficiency of Rapid Transit.



MARCH 17, 1917] ELECTRIC RAILWAY JOURNAL 121

When a company is equipped with "Tool Steel" gears and pinions, gear maintenance costs practically disappear

This is what one line is doing to reduce future maintenance.

1913 – "Tool Steel" gears specified on 240 new motors

" " " " 340 "

1914 – " " " " 400 "

1916 – " " " "

use of the latter suggested.

United Railways & Electric Company, Baltimore, Md., noted in the ELECTRIC RAILWAY JOURNAL of Dec. 9 as purchasing one hundred double-truck, semi-convertible, four-motor pay-within cars, announces that contracts have been awarded for the following equipment:

Car bodies and trucks	J. G. Brill Company
Motors	General Electric Company
Air brakes	Westinghouse Traction Brake Company
Seats	J. G. Brill Company
Signs	Hunter Illuminating Car Sign Company
Registers	International Register Company
Fare boxes	Johnson Fare Box Company
Gears and pinions	Tool Steel Gear & Pinion Company
Electric heaters	Consolidated Car Heating Company
Wheelguards	Wendell & MacDuffie Company
Car wheels	National Car Wheel Company
Ackley brakes	National Brake Company
Inspection	R. W. Hunt & Company

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, has received an ord[illegible] Boston Elevated Railway for 5000 trolley

And they have carefully tested other grades!!

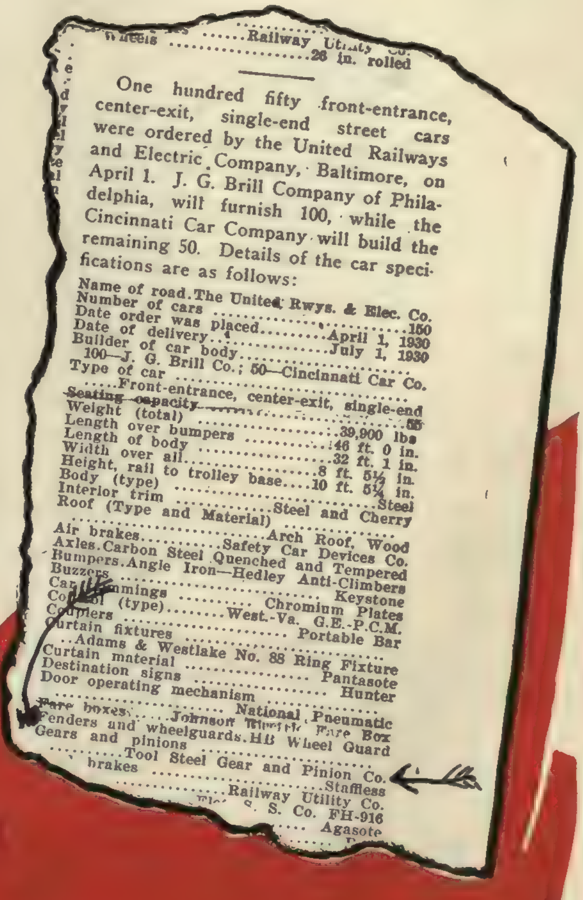
QUALITY.

and now

1930 "Tool Steel" gears
specified on 560 new motors.

NOTE: The Pinions bought in 1913-1914, 1916 are still only about 1/3 worn out.

The Tool Steel Gear & Pinion Co.
CINCINNATI—OHIO



Wheels ......Railway Utility Co.
......................26 in. rolled

One hundred fifty front-entrance, center-exit, single-end street cars were ordered by the United Railways and Electric Company, Baltimore, on April 1. J. G. Brill Company of Philadelphia, will furnish 100, while the Cincinnati Car Company will build the remaining 50. Details of the car specifications are as follows:

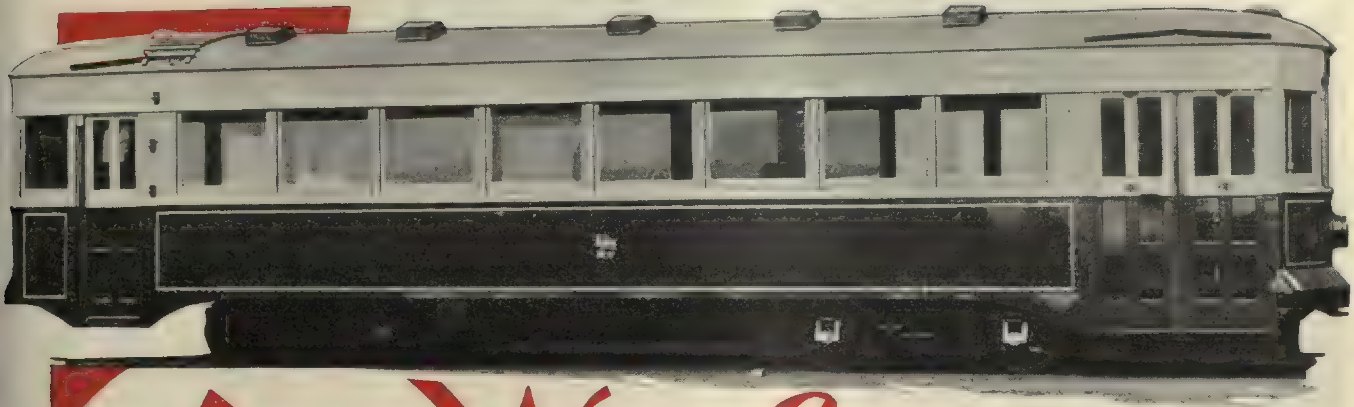
Name of road. The United Rwys. & Elec. Co.
Number of cars 150
Date order was placed.........April 1, 1930
Date of delivery...............July 1, 1930
Builder of car body.......................
100—J. G. Brill Co.; 50—Cincinnati Car Co.
Type of car ....
.....Front-entrance, center-exit, single-end
~~Seating capacity~~ 55
Weight (total) ....39,900 lbs
Length over bumpers ....46 ft. 0 in.
Length of body ....32 ft. 1 in.
Width over all.....................8 ft. 5½ in.
Height, rail to trolley base....10 ft. 5¼ in.
Body (type) ....Steel
Interior trim ....Steel and Cherry
Roof (Type and Material) ....
.......................Arch Roof, Wood
Air brakes...........Safety Car Devices Co.
Axles. Carbon Steel Quenched and Tempered
Bumpers. Angle Iron—Hedley Anti-Climbers
Buzzers .... Keystone
Car trimmings .... Chromium Plates
Control (type).........West.-Va. G.E.-P.C.M.
Couplers .... Portable Bar
Curtain fixtures ....
..Adams & Westlake No. 88 Ring Fixture
Curtain material .... Pantasote
Destination signs .... Hunter
Door operating mechanism ....
.... National Pneumatic
Fare boxes.....Johnson Electric Fare Box
Fenders and wheelguards. HB Wheel Guard
Gears and pinions ....
.........Tool Steel Gear and Pinion Co.
brakes ....Staffless
..............Railway Utility Co.
S. S. Co. FH-916
.... Agasote

The practice of using heavy viscous oils for electric railway car journal lubrication is being revolutionized. ● Today, after years of research and study, The Texas Company is providing the Electric Railway Industry with an entirely new system of car journal lubrication: Texaco Lovis Oils and Texaco Oil Seals. ● This new system of car journal lubrication is now in use on many electric railway properties; and the effect is notable:

1. The cost of lubrication has been lowered. ● 2. Power savings of considerable proportions are being attained. ● 3. Hot box trouble and excessive waste consumption have been ended. ● 4. Marked reduction in maintenance costs. ● Ask The Texas Company to send a lubrication engineer who will lay the facts before you. You will be interested in the results that are being accomplished—and the savings which you can enjoy through the use of The Texaco System of Electric car journal lubrication.

TEXACO LUBRICANTS

THE TEXAS COMPANY
135 East 42nd Street, New York City



One of the 40 New Type, Light Weight, One-Man Cars recently built for the Des Moines Railway Company.

40 New Cars for Des Moines

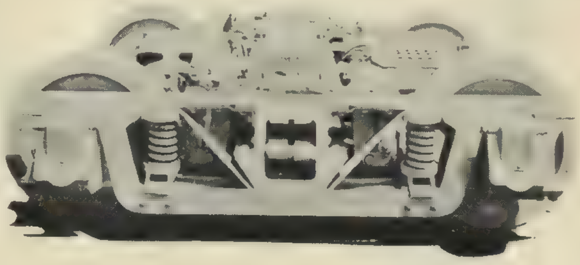
NOTE the well-proportioned design of these cars—the low, streamline effect obtained by the balanced relation of roof height, letter board, windows, and side sheets—the wide single sash windows that give maximum unobstructed vision.

With a 42′ 0″ overall length, these cars seat 51 passengers comfortably with a 31 inch spacing between seats. Low step heights are provided—15 and 13 inches respectively—with step wells and folding doors.

Every feature from the exterior design to the interior finish and equipment has been chosen with regard to pleasing appearance and passenger comfort.

The color scheme adds an unusually pleasing tone to the interior of these cars. An enamel finish has been used with a light cream headlining shading to dark brown wainscoting that matches the brown leather, semi-bucket seats.

Dome lights over the center line of seats provide excellent and attractive lighting.



Cummings No. 64 Equalizer type Trucks contribute to the lightweight, quiet, smooth riding qualities of these cars.

built by

CUMMINGS CAR AND COACH CO.

111 W. Monroe St. Chicago, Ill.

Spee

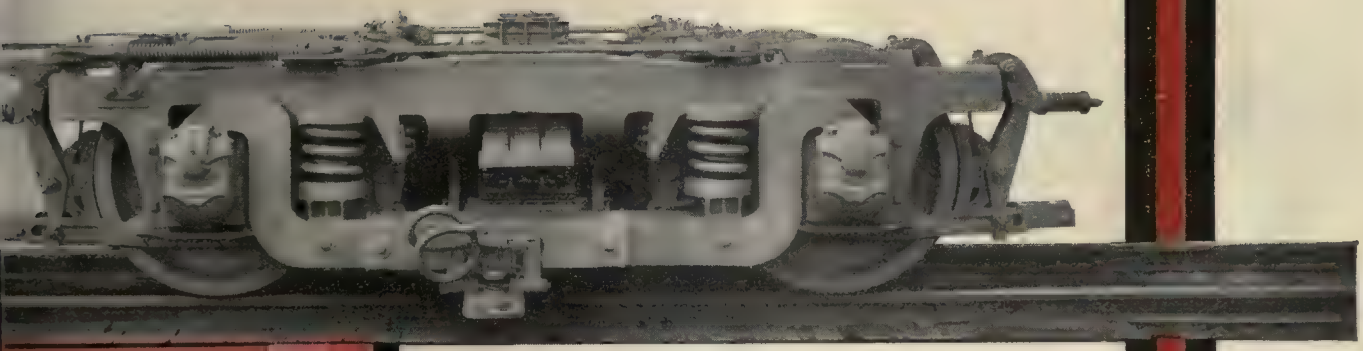
Balance
Brakin

Simplex Multiple Unit Clasp Brakes

ASF

AMERICA
NEW YORK

with Safety for P. R. T.



BRAKING today is an important consideration. Upon braking depends faster service and better schedules even though there are frequent stops.

Philadelphia Rapid Transit chose Simplex Multiple Unit Motor, Trailer and Truck Clasp Brakes for their 154 subway cars. P. R. T. service necessitates exacting brake requirements. The answer was complete Simplex installation—SPEED WITH SAFETY.

Simplex Multiple Unit Clasp Brakes give quick and smooth retardation and full release permitting rapid acceleration. Passenger comfort is assured. Wear and tear on truck equipment is minimized. Brake and truck maintenance is reduced.

The American Steel Foundries has an engineering staff which will develop the entire brake rigging design for efficient brake application. Due to different truck and underframe construction each clasp brake design is subject to an individual engineering study. Let us cooperate with you.

STEEL FOUNDRIES

CHICAGO ST. LOUIS

ASF

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

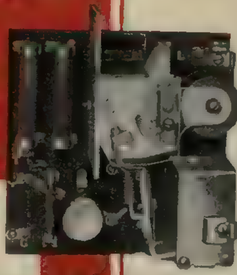
Car Comfort
with
Utility
Heaters
Regulators
Ventilators

Utility

Heating Regulating and Ventilating Equipment

KANSAS CITY ERIE MINNEAPOLIS CHICAGO OMAHA TOLEDO ST. LOUIS PROVIDENCE CONCORD

UTILITY HEATER
Fitted with Chromalox Enclosed Elements



UTILITY LATEST No. 10 HEAT REGULATING MAGNETIC SWITCH

ATLANTA PHILADELPHIA BOSTON HARTFORD NEWARK UTICA DULUTH DENVER DALLAS NEW ORLEANS TRENTON CITY PUBLIC SERVICE INDIANAPOLIS LINCOLN

UTILITY EXHAUST VENTILATOR

UTILITY INTAKE VENTILATOR

UTILITY THERMOSTAT
Keeps the Temperature Uniform Within 2°

SAN FR TTLE MADIS WICHITA MILWAUKEE TORONTO BUFFALO DETROIT CLEVELAND CINCINNATI ALBANY QUEBEC

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

MORE than 26,000 cars in these and hundreds of other cities throughout the United States and Canada are equipped with Utility Heating with Chromalox Strips, Regulating, and Ventilating Systems. They have been proven in all climates under all weather conditions—their design is the result of many years' experience in this wide field. They are successful from the operator's standpoint both in economy of electrical energy and in the revenue-building comfort assured.

Let us tell you the details about Utility advantages.

RAILWAY UTILITY COMPANY

New York 2241 TO 2247 INDIANA AVE. CHICAGO, ILLINOIS Montreal, Can.

A Coach
for every
class of
service
Yellow Coaches
YELLOW
COACH

A COACH FOR EVERY

type U

For Light Traffic
For Frequent
Headways

Parlor Coach
16 passengers

City Service Coach
21-23 passengers

Standard Observation
Parlor Coach
21 passengers

Brief Specifications

Wheelbase: Standard 185″; Special 215″

Engine: 6 cylinder. Overhead valve 90 hp.

Frame: Pressed steel. Rigid type. 7 cross members

Axle: Underslung worm and wheel

Brakes: 4 wheel duplex hydraulic with vacuum booster

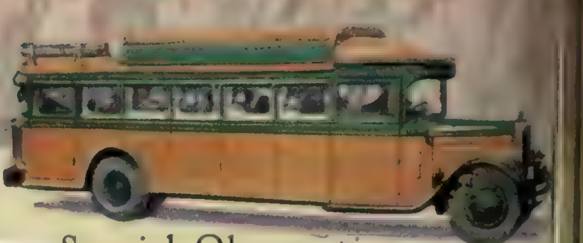
Transmission: Unit power plant type, 4 speed

Generator: 12 volt, 600 watt

Tires: Standard. 34 x 7.5 balloon; Dual rear
Special. 36 x 8.25 balloon; Dual rear

Gasoline Tank: 46 gal. capacity

Complete body and chassis specifications on request



Special Observation

CLASS OF SERVICE

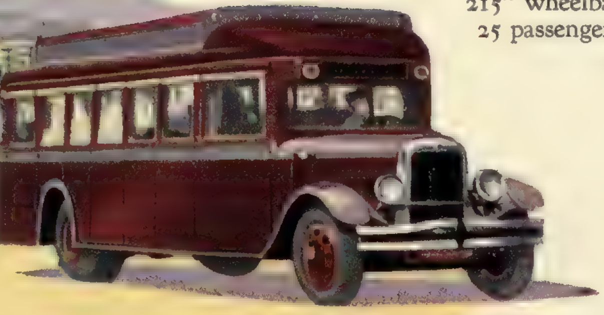
type W

For
De Luxe Express Service
Feeder Line Service
Small City Service
Intercity Service

Parlor Coach
17 passengers

City Service Coach
21-23 passengers

Standard Observation
Parlor Coach
21 passengers



Special Observation
Parlor Coach
215″ wheelbase
25 passengers

City Service De Luxe

Brief Specifications

Wheelbase: Standard 185″; Special 215″
Engine: 8 cylinder. V type; 95 h.p.
Frame: Pressed steel. Rigid type. 7 cross members
Axle: Underslung worm and wheel
Brakes: 4 wheel duplex hydraulic with vacuum booster
Emergency brake on double drums on propellor shaft
Transmission: Unit power plant type, 4 speed
Generator: 12 volt, 600 watt
Tires: Standard 34 x 7.5 balloon; Dual rear
Special 36 x 8.25 balloon; Dual rear
Gasoline Tank: 46 gal. capacity

A COACH FOR EVERY

type Z 29

A Nationally Famous Model—
Now Available With Many
New And Noteworthy
Improvements

City Service Coach

Provides a maximum of comfort for 29 seated passengers with unusually liberal seat spacing (31 inches). An alternative arrangement provides seats for 31 passengers or for 29 passengers with air operated rear door. Air operated front door standard.

Chassis

Wheelbase: 225″
Engine: 6 cylinder. Sleeve valve; 100 h.p.
Axles: Front—Heavy reverse Elliott type
Rear—Underslung worm and wheel
Brakes: 4 wheel Westinghouse air. Gun iron drums with easily removable brake liners
Transmission: 4 speed midship mounting, 3 point suspension
Generator: 12 volt; 600 watt
Tires: 40 x 9 balloon; Dual rear
Also available Type 616—150 h.p. overhead valve engine at

Body

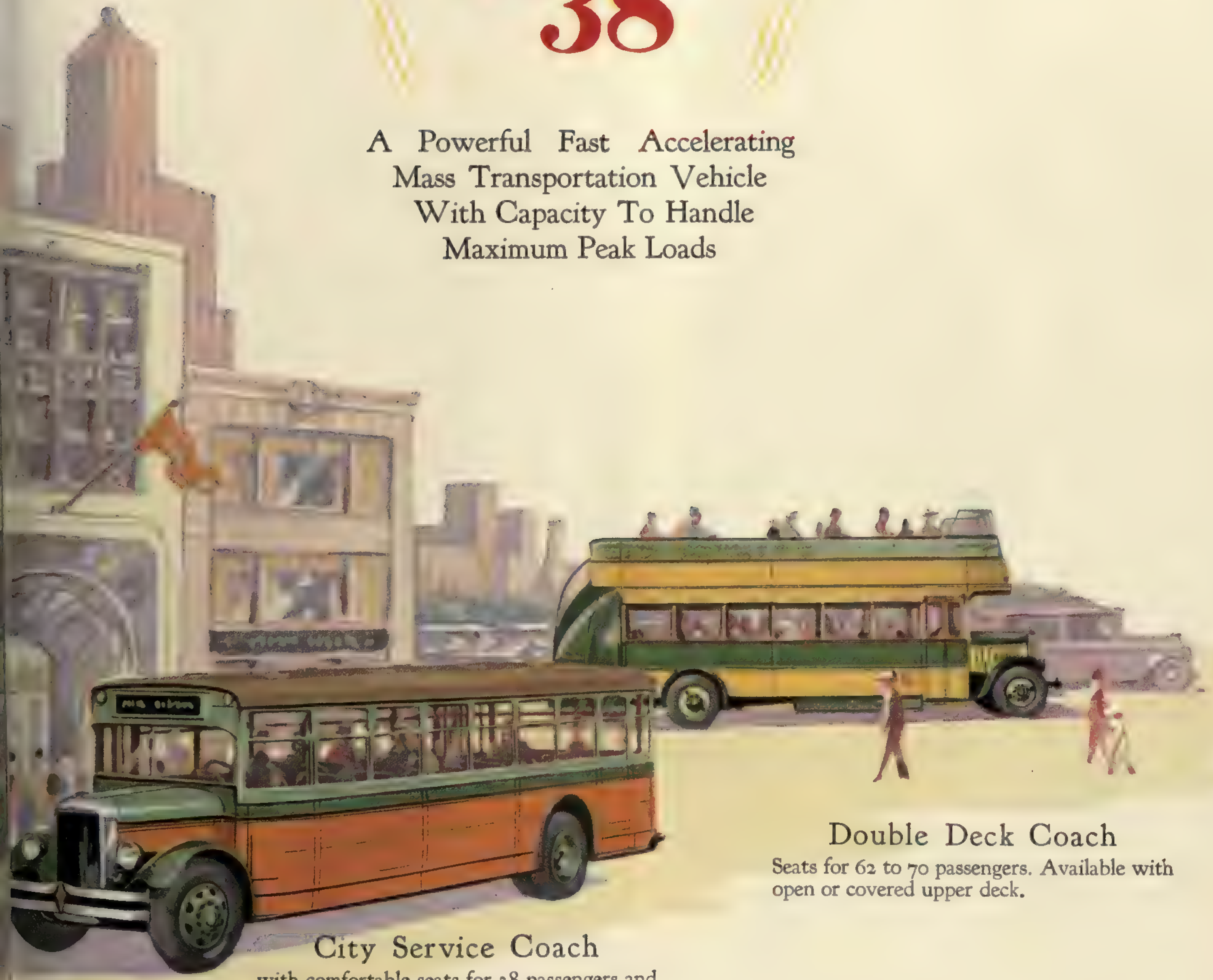
Rigid all-metal construction. (Chiefly duralumin and other aluminum alloys.) A great achievement in body building. Remarkably strong and enduring. Maintenance greatly simplified and upkeep costs greatly reduced. Built throughout of standardized parts and sections which fit as accurately as the chassis parts. Sections easy to renew with unskilled labor. Many parts interchangeable.

Complete chassis and body specifications

CLASS OF SERVICE

type Z 38

A Powerful Fast Accelerating
Mass Transportation Vehicle
With Capacity To Handle
Maximum Peak Loads



Double Deck Coach

Seats for 62 to 70 passengers. Available with open or covered upper deck.

City Service Coach

with comfortable seats for 38 passengers and ample room for standees. Front and rear doors air operated.

Chassis

WHEELBASE: 240″

ENGINE: 6 cylinder. Overhead valve. Type 616 150 h.p. Silenced with Zero-lash adjuster. Counter-weighted crank-shaft with harmonic balancer. Dual ignition, dual down draft carburetors, dual fuel pumps, dual coils and condensers.

AXLE: Full floating worm drive

BRAKES: 4 wheel Westinghouse air. Gun iron drums with easily removable brake liners

TRANSMISSION: 4 speed midship mounting

GENERATOR: 12 volt, 750 watt

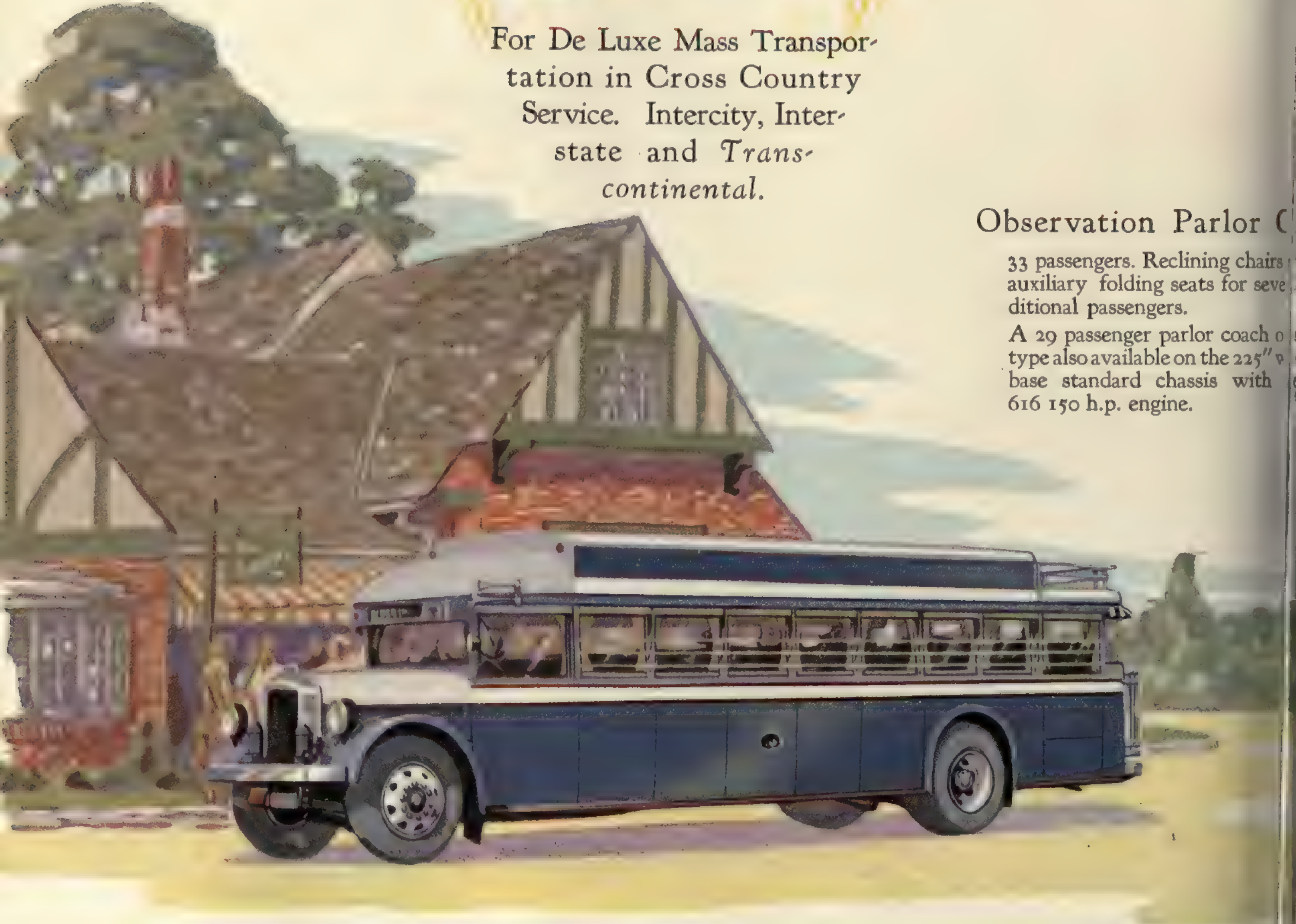
Body

Same design and construction as Z-29. Advantages of this type all-metal body include big reduction in excess dead weight, great structural strength, increased safety and protection against fire. Being all metal it has longer life and greater endurance and greater resistance against disintegration from the elements. It has thinner wall sections and more body and revenue area, greater window area and improved vision for passengers, with greatly simplified maintenance.

A COACH FOR EVERY

type 250

For De Luxe Mass Transportation in Cross Country Service. Intercity, Interstate and *Transcontinental.*



Observation Parlor C

33 passengers. Reclining chairs
auxiliary folding seats for seve
ditional passengers.

A 29 passenger parlor coach o
type also available on the 225″ w
base standard chassis with
616 150 h.p. engine.

Chassis

Wheelbase: 250″

Engine: 6 cylinder. Overhead valve. Type 616 150 h.p. Silenced with Zero-lash adjuster. Counterweighted crank-shaft with harmonic balancer. Dual ignition, dual down draft carburetors, dual fuel pumps, dual coils and condensers.

Axle: Bevel gear, full floating

Brakes: 4 wheel Westinghouse air. Gun iron drums with easily removable brake liners

Transmission: 4 speed, unit power plant type

Generator: 12 volt, 750 watt

Tires: 40 x 9.75 balloon; Dual rear

Gasoline capacity: 140 gal. Dual tanks

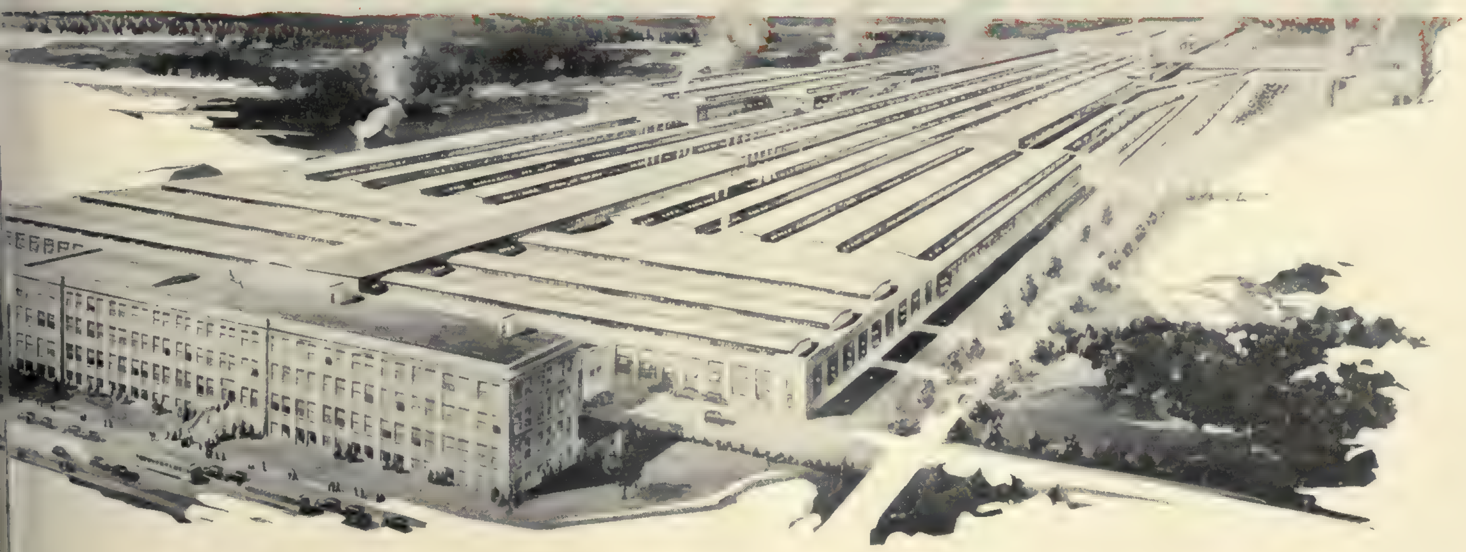
Body

Fully de luxe. Overall coach length 32′; width 96″; headroom 79″; 40″ reclining chairs with individual backs and head rests. Interior luggage rack. Dual Tropic-Aire Heaters

Complete body and chassis specifications on request

The
Greatest Name in
Commercial Highway
Transportation
is back of

YELLOW COACHES



THE reason for Yellow Coach performance is easy to understand when you are familiar with the unexcelled engineering, research, testing and manufacturing facilities that play an essential part in the production of Yellow equipment.

Yellow Coaches are built in a great new $8,000,000 plant at Pontiac where there is every modern facility for efficient, economical production. Among production men, the General Motors Truck Company plant is rated as one of the most modern and efficient, as well as the largest plant in the world devoted exclusively to the production of commercial transportation vehicles.

To really appreciate its size, its capacity and its flexibility of operation and the modern methods employed to reduce labor waste and improve efficiency of production one must visit and inspect this great plant in person.

Only by coming to Pontiac, as many Coach operators do, can these economic advantages be properly demonstrated and visualized and their relation to the progress of highway transportation be correctly valued and understood.

YELLOW COACH FLEETS
Of 40 Or More Coaches

(April 30, 1930)

Public Service Co-ordinated Transport	1,705
Chicago Motor Coach	549
Greyhound System	466
Philadelphia Rapid Transit	465
Fifth Avenue Coach, New York	254
Peoples Motorbus, St. Louis	196
Toronto Transportation Commission	120
Illinois Power & Light	114
Eastern Mich. Motorbuses, Detroit	113
Department of St. Rwys., Detroit	106
Washington Railway & Electric Co.	86
Connecticut Co., New Haven	82
International Railway Corp., Buffalo	81
New England Transportation Co., Boston	81
Montreal Tramways	70
Milwaukee Electric Rwy. & Light	66
Pittsburgh Motor Coach Co.	59
Camel City Coach, Winston-Salem, N. C.	56
Shore Line Motor Coach, Hammond, Ind	56
Northern Ohio Power & Light, Akron	55
Blue & Gray Transit, Charleston, W. Va	54
Provincial Transport, Montreal	45
Washington Rapid Transit	45
Worcester Consolidated Street Rwy	45
Community Traction Co., Toledo	44
Metropolitan Motor Coach, Chicago	43
Boston & Maine Transportation	42
Union Pacific System	42
Detroit Motorbus Company	40
Wisconsin Power & Light Co.	40

and over 400 other Yellow Coach fleets of less than 40 coaches

First Choice of America's Leading Operators

YEAR after year the electric railways have consistently bought far more Yellow Coaches than any other make.

Year after year, Yellow consistently leads among steam railway operators.

Far more Yellow Coaches are placed in operation every year, *in all classes of service*, than any other make of coach.

It is this combined judgment of so many successful and experienced operators that furnishes conclusive evidence of the superior operating value of Yellow equipment.

For the true *test* of leadership is *performance*.

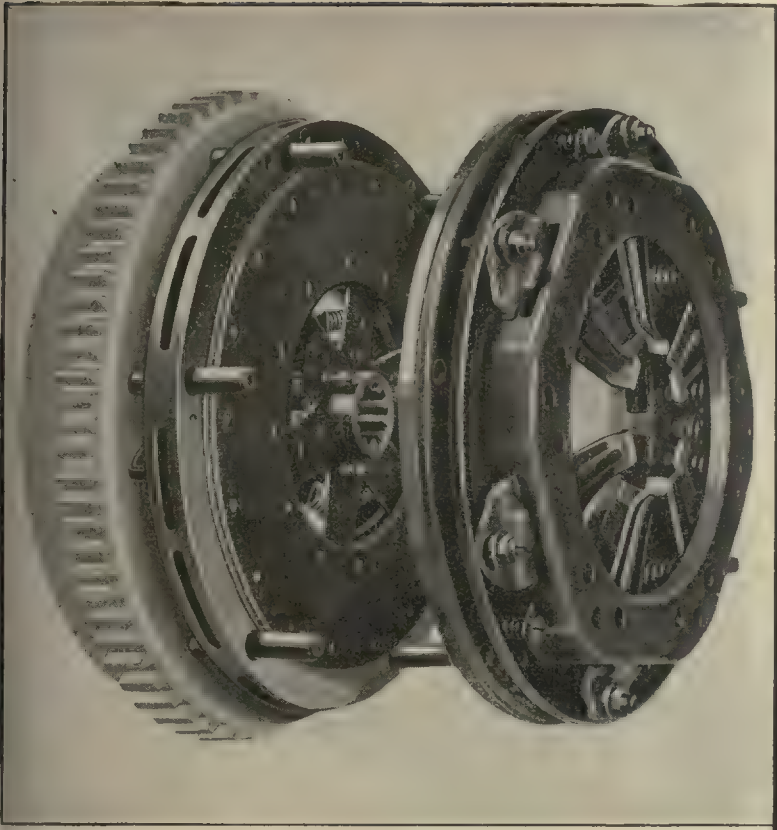
That Yellow operators know and appreciate the value of Yellow Coach dependability, endurance and low operating costs is proved conclusively by this significant fact—

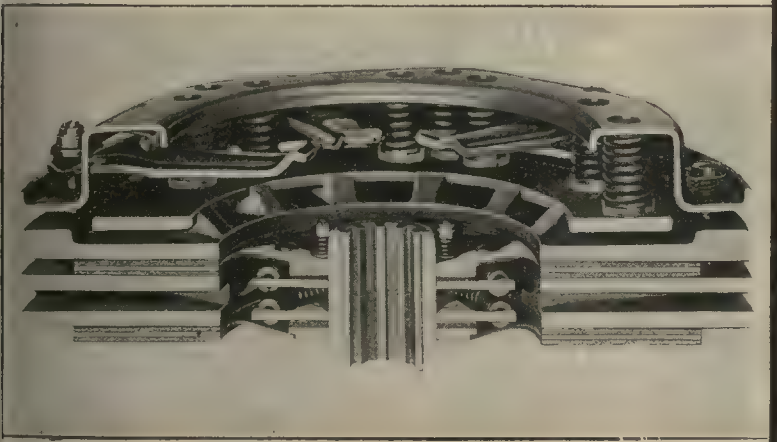
80 per cent of Yellow Coach sales are repeat sales. Yellow Coach operators choose Yellow over and over and over again.

It is logical to select equipment that has back of it such convincing proof of leadership.

GENERAL MOTORS TRUCK COMPANY
Pontiac, Mich.
Subsidiary of Yellow Truck & Coach Manufacturing Co.

YELLOW COACHE





A NEW HEAVY DUTY DESIGN

FOR BUSES TRUCKS AND TRACTORS

LONG

AUTOMOTIVE CLUTCHES

AUTOMOTIVE RADIATORS

LONG

LONG MANUFACTURING COMPANY
DETROIT, MICHIGAN

BYLLESBY
ENGINEERING · FINANCE · MANAGEMENT
PIONEERS IN PUBLIC SERVICE

Subsidiary and affiliated public utility companies of

STANDARD GAS & ELECTRIC COMPANY

serve 1,588 cities and towns, with combined estimated population of 6,300,000, in twenty states. As of December 31, 1929, customers of all classes were 1,592,188, and total installed electric generating capacity was 1,390,214 kilowatts. Transportation service, either electric railway, motor coach, or both, is supplied in 147 cities and towns, including San Francisco and Pittsburgh.

THE SYSTEM INCLUDES:

The California Oregon Power Company
Duquesne Light Company (Pittsburgh)
Equitable Gas Company (Pittsburgh)
Kentucky West Virginia Gas Company
Louisville Gas and Electric Company
Market Street Railway Co. (San Francisco)
Mountain States Power Company
Northern States Power Company
Oklahoma Gas and Electric Company
Philadelphia Company
Pittsburgh Railways Company
San Diego Cons. Gas and Electric Co.
Southern Colorado Power Company
Wisconsin Public Service Corporation
Wisconsin Valley Electric Company
Deep Rock Oil Corporation

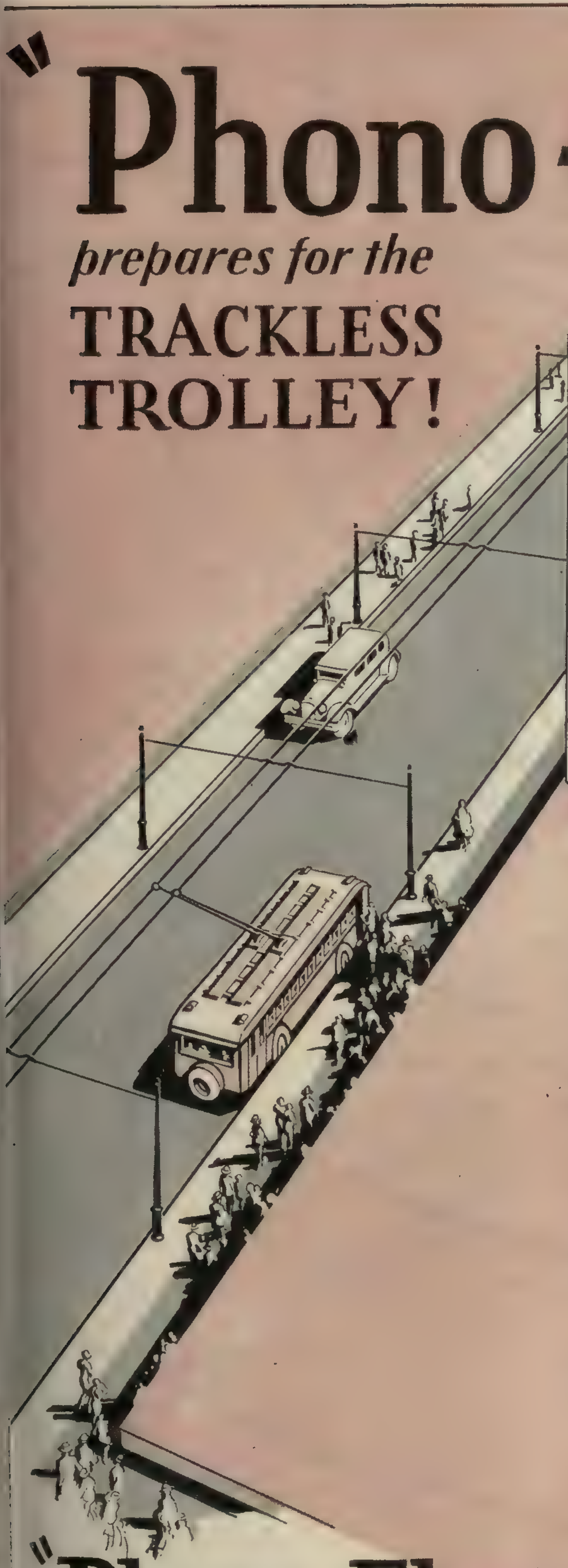
BYLLESBY ENGINEERING AND MANAGEMENT CORPORATION

ENGINEERS—MANAGERS

231 South La Salle Street, Chicago, Illinois

"Phono-Electric"

prepares for the TRACKLESS TROLLEY!



for

the new trackless trolley being installed by the Chicago Surface Lines, old, dependable Phono-Electric Wire has been selected.

The route covers thirty miles, and for the initial installation 3/0 Phono (Hi-Con) is used for the positive and negative circuits.

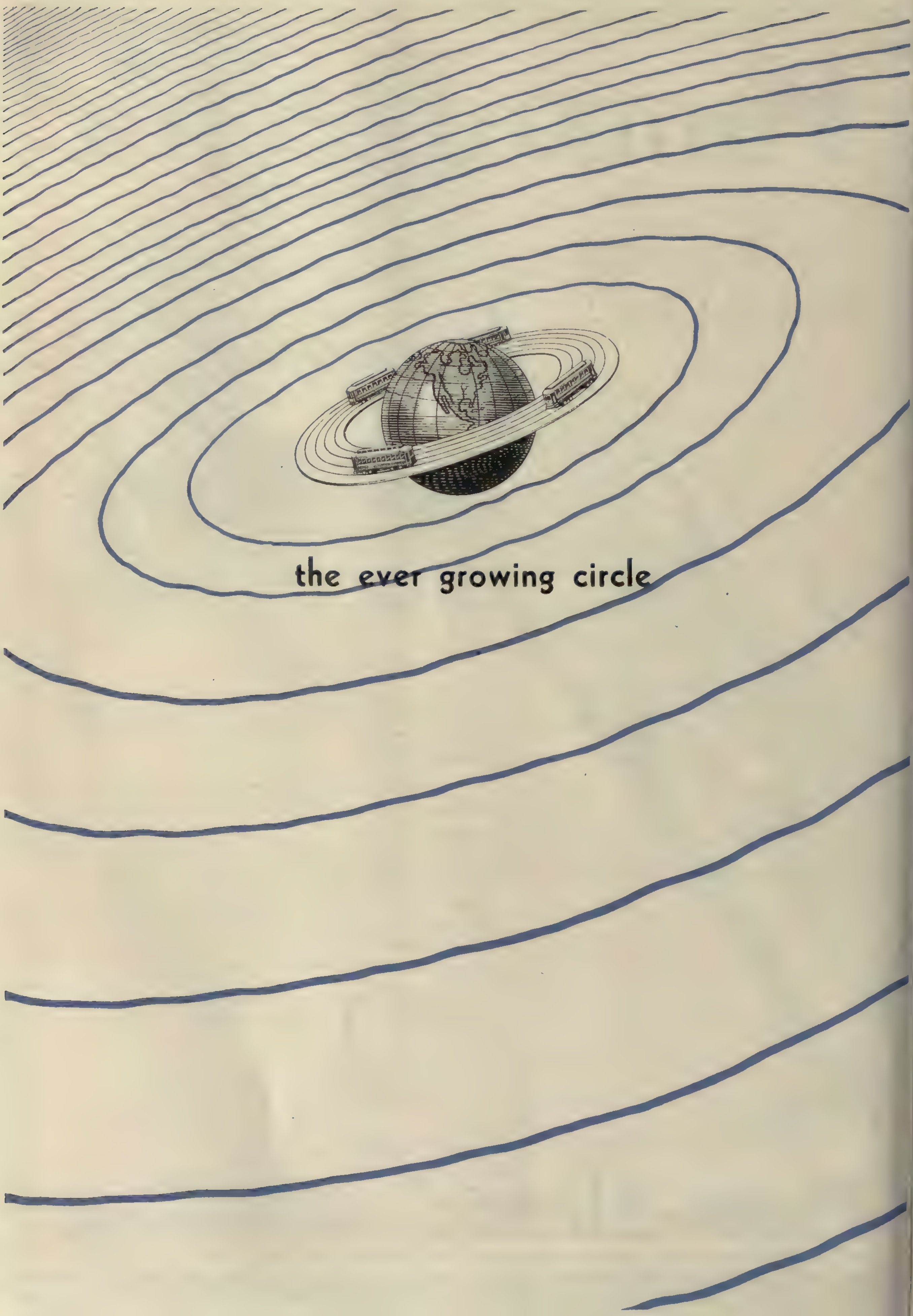
In this most modern electric traction there is the need for an unusually tough wire—to resist side stresses safely. Phono-Electric provides the strength and corrosion resistance necessary to long, low maintenance service. With a tensile strength far above copper, it offers comparable electrical characteristics because of high conductivity.

A pioneer alloy, Phono-Electric is the leader today for overhead uses—including clamps, bolts, nuts, hanger rods, and wire.

Write to Bridgeport for details of Phono Alloys and their application to the entire catenary structure

"Phono-Electric" Bronze Alloy TROLLEY & SPAN WIRE

BRIDGEPORT BRASS COMPANY General Offices, East Main St., **BRIDGEPORT, CONN.**


the ever growing circle

—the ever growing circle
of friends

—the familiar faces that greet us now and again through the busy decades

—the increasing respect for those who are growing up in the Electric Railway Industry

—the accumulation of pleasant memories

—the appreciation of the good will and cooperation of associates.

These are real compensations to all of us who have worked together over a period of years.

BARRON G. COLLIER, INC.
NEW YORK

TRACK

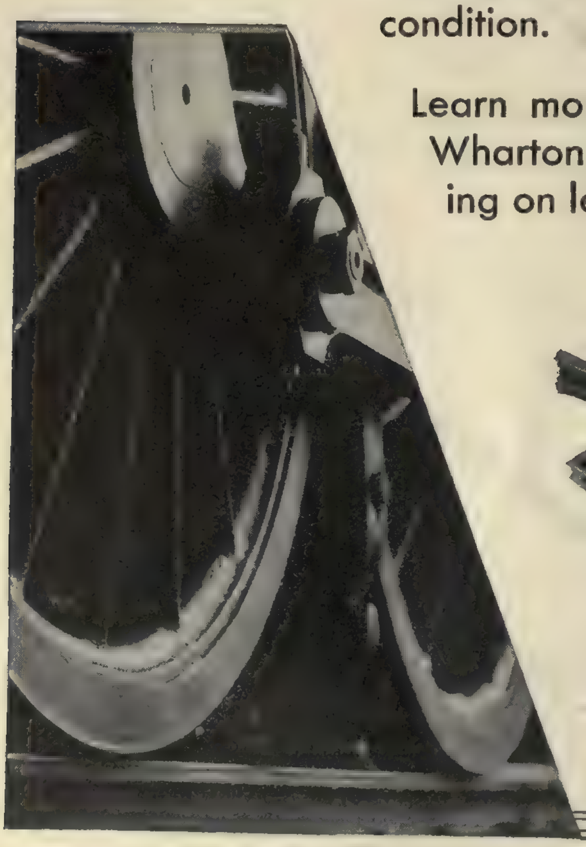
maintenance—drops a Heavy Burden

NO LONGER is track maintenance on the fifty leading roads that have installed the new Wharton crossing heavily burdened with excessive crossing costs.

For these roads are no longer dependent on crossings not scientifically designed and engineered to meet the severest tests of service.

The new Wharton crossing is the first and only crossing scientifically designed and built to withstand the ceaseless pounding of locomotives, cars and loadings. It will give far longer service, and appreciably lower crossing maintenance under any operating condition.

Learn more about the design of the new Wharton crossing and the service it is giving on leading roads. Ask for bulletin 1 C.

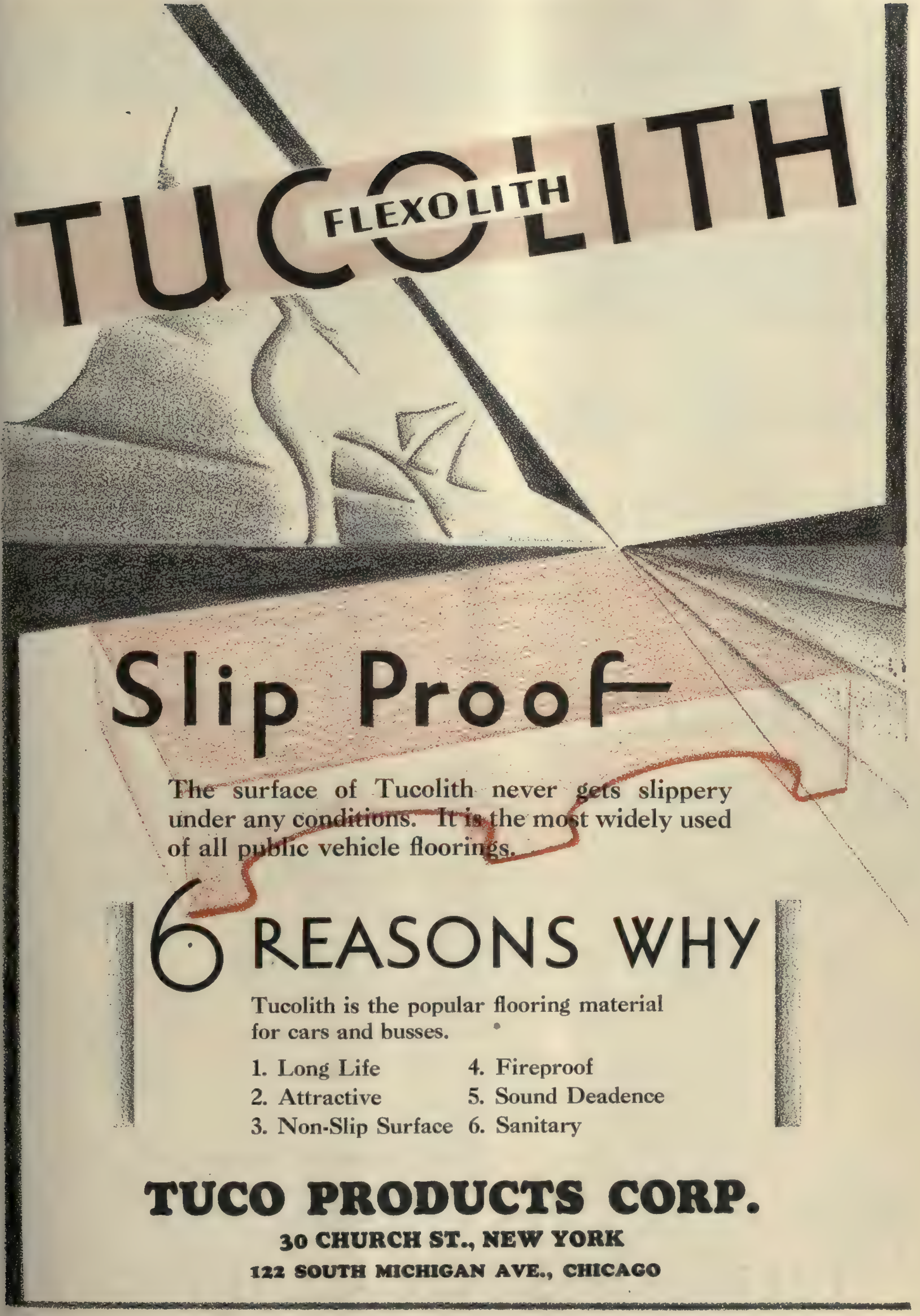


Wm. Wharton Jr. & Co.

INCORPORATED

EASTON, PENNSYLVANIA

SALES OFFICES: Pittsburgh Chicago Houston Montreal New York
Philadelphia Boston San Francisco Scranton Los Angeles



Slip Proof—

The surface of Tucolith never gets slippery under any conditions. It is the most widely used of all public vehicle floorings.

6 REASONS WHY

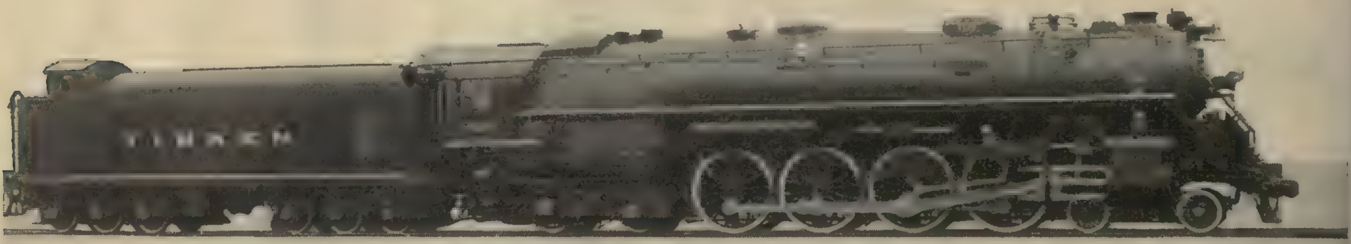
Tucolith is the popular flooring material for cars and busses.

1. Long Life
2. Attractive
3. Non-Slip Surface
4. Fireproof
5. Sound Deadence
6. Sanitary

TUCO PRODUCTS CORP.

30 CHURCH ST., NEW YORK
122 SOUTH MICHIGAN AVE., CHICAGO

THE NEW TIMKEN LOCOMOTIVE



LUBRICATED EXCLUSIVELY by STANDARD OIL COMPANY (INDIANA)

This great Timken Locomotive inaugurates a revolutionary departure in locomotive design. It is the first locomotive ever built to be so completely equipped with roller bearings.

On the first series of test runs, just completed, Standard Oil Company (Indiana) Lubricants were used for the entire lubrication of the locomotive. It speaks well for these lubricants that at no time did they fail to function perfectly, contributing faultlessly their share to the 100% performance given by all roller bearings.

Standard Oil Company (Indiana) Lubricants will be used on this locomotive when it goes into service on America's leading railroad systems.

STANDARD OIL COMPANY (Indiana)
910 South Michigan Avenue Chicago, Illinois

STANDARD OIL COMPANY (INDIANA) SERVICE

LUBRICANTS FOR ALL INDUSTRY

USE YOUR OWN
COST FIGURES
FOR REPAIRS TO
RAIL JOINTS - -

DO THIS FIGURING YOURSELF AND COMPARE THE RESULTS

Use your own cost figures for repairs to rail joints - - -

HERE is a simple and convenient estimate form for comparing actual costs of joint repairs. Try it, using costs from your own actual experience. Your own labor costs! Your own "local conditions"! Tell us the rail section and we will furnish the cost of the Thermit material.

See for yourself what the difference is!

A careful analysis of the comparative costs will show that a permanent Thermit welding job costs but little more than the ordinary patch job. The difference of a few dollars, at most, affords a Thermit-welded joint which lasts as long as the rail itself. The patch job usually has to be done over again in a few years, and the life of the rail is actually shortened.

TIMATE *for*
PATCHING
bolted joint – – –

t permit from city opening street	x x x x x
otify Transportation epartment of work	x x x x x

BOR

pen Pavement	
move old plates d clean rail	
rface Joint	
icksmith and replace plates	
ilding up and welding	
place Concrete	
place Pavement	
nding	
ucking Material and Men	
tchmen	
ays to Traffic	
ervision	
cl.	
al Labor	

TERIAL

ing Material	
crete Material	
s and Plates	
ding Material	

l estimated Cost	

ESTIMATE *for*
THERMIT-WELDING
old bolted joint – – –

Get permit from city for opening street	x x x x x
Notify Transportation Department of work	x x x x x

LABOR

Open Pavement	
Remove old plates and clean rail	
Surface Joint	
THERMIT * WELD	
Replace Concrete	
Replace Pavement	
Grinding	
Trucking Material and Men	
Watchmen	
Delays to Traffic	
Supervision	
Miscl.	
Total Labor	

MATERIAL

Paving Material	
Concrete Material	
THERMIT * * MATERIAL	

Total estimated Cost	

SPECIMEN COPY

* 3 man-hours

** Thermit Material depends on rail section. Send for data.

You pay for Thermit whether you use it or not

TAKING your own figures from the estimates suggested on the preceding page isn't it far cheaper to Thermit weld once, than to patch the same joint two or three times in the next few years? The honest answer must be—*yes!* In this sense you more than pay for a Thermit weld, even if you don't use it.

Think of the saving of wear and tear on the track structure and on rolling stock, if a permanent smooth welded rail replaces a lot of troublesome joints.

Think of the better public feeling when track is permanently fixed, instead of constantly being torn up for joint repairs.

And you may be surprised to learn how much wear can be secured from old rail that now appears to be near the end of its useful life. Thermit-welding has rejuvenated many an old piece of track that was thought to be ready for complete reconstruction.

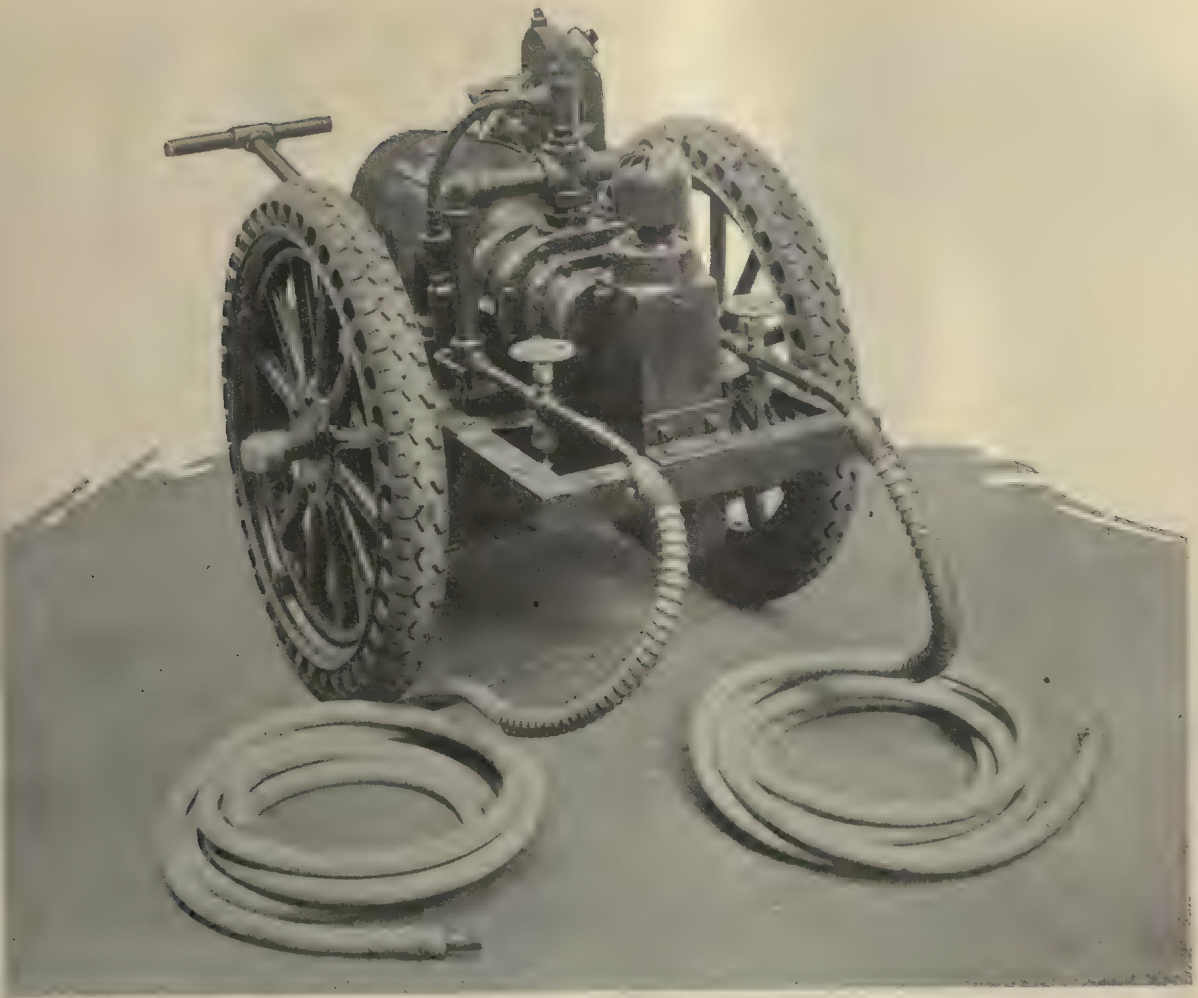
We shall be glad to inspect old track, make recommendations, and furnish estimates for getting rid of the rail joints once and for all.

Send for estimate sheet which contains the items listed on the third page of this insert.

METAL & THERMIT CORPORATIO

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO



THERMIT ANNOUNCES
a New Rail-Welding Preheater

. . a new light weight equipment . . . . . .

. . especially designed for maintenance work

. . simple and efficient in operation . . . . .

. . *and at a new low price!* . . . .

[*There are no exhibits at this year's Convention. So we take this means of displaying our new equipment. Further details on request.*]

THERMIT

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK, N.Y.
PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO

US TIRES

The Big Swing is to U. S. Tires

The

MISSOURI-PACIFIC TRANSPORTATION COMPANY

OF ST. LOUIS

Another great Bus Fleet recently equipped with the

U. S. ROYAL

HEAVY SERVICE

UNITED STATES RUBBER COMPANY WORLD'S LARGEST PRODUCER OF RUBBER

HASKELITE

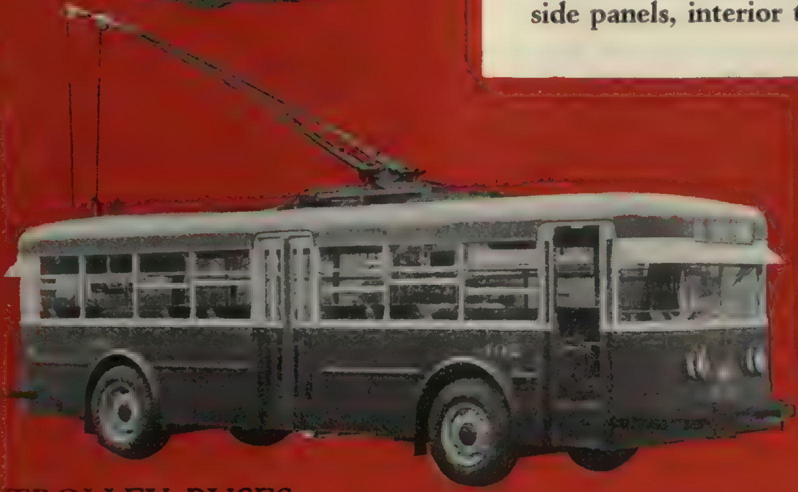
STREET CARS

The largest operators choose Haskelite products

The advantages of Haskelite and Plymetl in producing safe and economical cars and buses are recognized by the leading electric railways throughout the country. When quality is sought in roofs, side panels, interior trim, or floors, consult a Haskelite engineer. Let us give you data on Haskelite and Plymetl applications and furnish estimating costs.

60 Electric Railways bought Haskelite or Plymetl during the past year. Note the following list:

- Atlantic City & Shore R.R.
- Burlington Rapid Transit Co.
- Birmingham Electric Co.
- Brooklyn & Queens Transit Corp.
- Chicago Surface Lines
- Chicago, North Shore & Milwaukee R.R. Co.
- Chicago, South Bend & Northern Indiana R.R. Co.
- Chicago, South Shore & South Bend R.R.
- Cincinnati Street Ry. Co.
- Cleveland Railway Co.
- Columbus Ry., Power & Light Co.
- The Connecticut Company
- Danville Traction & Power Co.
- Detroit Street Railways
- Des Moines City Railway Co.
- Duluth Street Railway Co.
- Eastern Michigan Railways
- Fort Smith Traction Co.
- Georgia Power Company
- Grand Rapids Railroad Co.
- Harrisburg Railways Co.
- Houston Electric Co.
- Indianapolis Street Railway Co.
- Jacksonville Traction Co.
- Knoxville Power & Light Co.
- Lake Shore Electric Ry. Co.
- Louisville Railway Co.
- Los Angeles Railway Corp.
- Milwaukee Electric Ry. & Light Co.
- Nashville Railway & Light Co.
- New York & Queens County Ry. Co.
- New Haven & Shore Line Ry. Co.
- New Orleans Public Service, Inc.
- Northern Ohio Power & Light Co.
- Northern States Power Co.
- Northern Texas Traction Co.
- Oklahoma Railway Co.
- Omaha & Council Bluffs St. Ry. Co.
- Pacific Electric Railway Co.
- Philadelphia Rapid Transit Co.
- Pittsburgh Railways Co.
- Public Service Coordinated Transport
- Rochester & Syracuse R. R. Co.
- Rockford Electric Co.
- Saskatoon Municipal Railways
- Savannah Electric & Power Co.
- Trenton & Mercer County Traction Co.
- United Electric Railways Co.
- United Service Company (The)
- United Traction Co.
- Utah Light & Traction Co.
- Virginia Electric & Power Co.
- Virginia Public Service Co.
- Washington, Baltimore & Annapolis Electric Railroad Co.
- Western Ohio Railway & Power Co.
- West Penn Railways Co.
- Wichita Falls Traction Co.
- Wisconsin Power & Light Co.
- Wilkes-Barre Railway Co.
- Youngstown Municipal Ry. Co.



TROLLEY BUSES

TRAVEL BY AIR U.S. AIRMAIL

BUSES

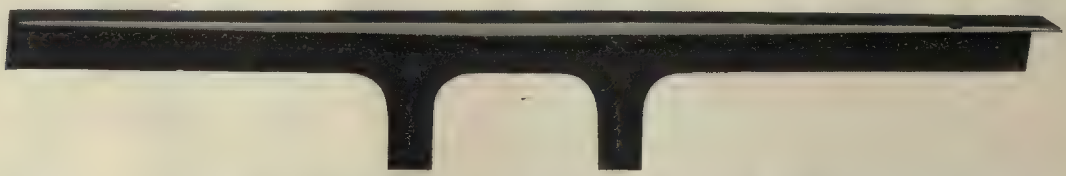
Haskelite Manufacturing Corporation
120 South La Salle Street
Chicago, Illinois

There is a representative in your territory. Name on application.

PLYMETL

ERJ-6-14-Gray

STARK ELECTRIC



The Remedy for Low Joints Caused by Wear

The Stark Electric Railroad Company of Alliance, Ohio, have completed the rehabilitation of 33 miles of open track by a 100% installation of True Temper Tapered Rail Joint Shims. The first shims were used in January, 1928, and proved to be such an economical and satisfactory method of restoring a worn track to first class condition that the entire line was put into shape using the same device.

This outstanding track rehabilitation job was accomplished at low cost for both material and labor. The cost of True Temper Tapered Rail Joint Shims was about ¼ that of any other acceptable method and this was the only material cost as the existing bars and rails were used. Labor cost for installation was low as the shims are applied by loosening the joint bolts and slipping them in place.

The application of True Temper Rail Joint Shims levels up worn rail joints and restores the track to first class condition. Riding qualities are thus greatly improved, passenger traffic encouraged, car maintenence costs are reduced,

Stark Electric Joint Shim installation. Note conformity to worn fishing angle and restoration of rail to original true surface.

This, and other pictures here, taken on double track. Note conformity of shim to unequal wear in leaving and receiving end of joint.

TRUE TEMPER TAPERED

RESTORES ENTIRE OPEN TRACK MILEAGE . . . WITH *TRUE TEMPER SHIMS*

The above shows outside of joint illustrated on opposite page. Note insertion of shim without interference with rail bonding.

Picture below shows tapered rail joint shim in position after two years of service. Note perfect rail surface.

power consumption is kept on an economical basis and track maintenance cost is held down.

Mr. J. H. Weber, superintendent of ways and structures, The Stark Electric Railroad Company, says in effect, "I never could have done the job of properly rehabilitating our track mileage without the use of True Temper Tapered Rail Joint Shims."

What has been accomplished on this road can be accomplished on any other by the use of True Temper Tapered Rail Joint Shims. These shims are made in 4 length and thickness combinations. Full information gladly furnished on request.

The American Fork & Hoe Co.
General Offices: Cleveland, Ohio
Factory: North Girard, Pa.

District Offices
Whitehall Bldg., New York, N. Y.
Daily News Plaza, Chicago, Ill.

Representatives at
Boston, Denver, Detroit, Minneapolis, St. Louis and San Francisco

Foreign Representatives
Wonham, Inc., 44 Whitehall St., New York, N.Y. and 68-72 Windsor House, Victoria St., London, S.W.-1.

RAIL JOINT SHIM

You can win back the crowds with improved equipment . . .

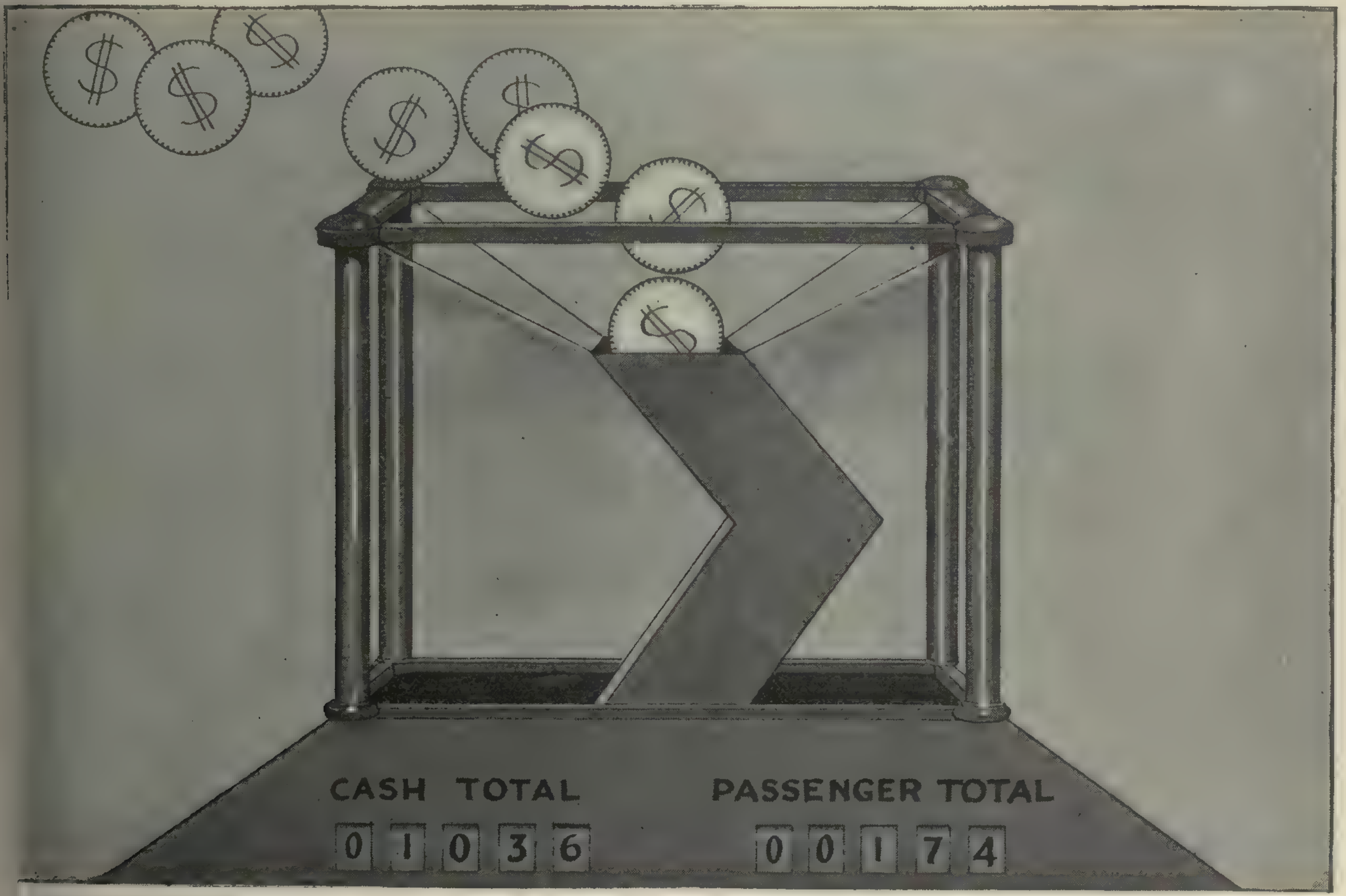
ELECTRIC railway and bus line operators everywhere now realize that to get peak crowds—and to hold them—to bring back the days of the full fare box, requires the use of improved equipment that caters to the public's desire for greater comfort and faster transportation. It is here that Johns-Manville Service to Transportation plays its part by assisting you to modernize your equipment in a way that will, at the same time, keep down maintenance costs.

Johns-Manville Insulation brings quiet and comfort to the interiors of cars and buses. J-M Hair Felt for upholstery is comfortable to the rider, and sanitary . . . J-M Flooring provides safety underfoot and bears the onslaught of the heaviest passenger traffic.

Listed below, to serve as a convenient reminder, are these and many other of the products around which Johns-Manville Service to Transportation is built.

Let J-M products contribute to the comfort your passengers demand. It may be an important step in selling the crowd whose regular fares push down operation costs. Install J-M materials as standard equipment, as many other lines throughout the country have done. Johns-Manville Service to Transportation has kept pace with the needs of this growing industry and is now prepared to supply an invaluable service to the development of the electric railway car and the bus. Address Johns-Manville, New York, Chicago, Cleveland, San Francisco, Montreal.

Johns-Manville
SERVICE TO
TRANSPORTATION



JOHNS-MANVILLE SERVICE TO TRANSPORTATION

ACKINGS · REFRACTORY CEMENTS · FRICTION TAPE · INSULATING TAPE · CELITE FOR CONCRETE
AR AND BUS FLOORING · READY-TO-LAY ROOFING · FIREPROOF BRIDGE DECKING · WATERPROOFING
UILT-UP ROOFING · BUS AND AIRPLANE INSULATION · MASTICOKE FLOORING · ASBESTOS SHINGLES
MOKE JACKS · ELECTRICAL PARTS · TRANSITE PIPE · PASSENGER AND REFRIGERATOR CAR INSULATION
TRANSITE · INSULATIONS · BRAKE LINING AND BRAKE BLOCKS

44%
ERICO

THERE are 37,000 miles of Electric Railway trackage in the United States. (See Electric Railway Journal for January 1930).

Of this mileage, users of Erico Rail Bonds represent a total of 44.3%.

For your information—as well as profit—let us tell you why. Write today.

ELECTRIC RAILWAY
IMPROVEMENT CO.
2070 E. 61st Place, Cleveland, Ohio

DB
SPRUCE AVE
IT WILL
PAY YOU_

. . . to buy
DODGE BROTHERS

Dodge Coaches

Your Investment Will Be Smaller, Your Costs Lower, Your Schedules More Dependable, Your Patrons Highly Pleased

Operators, in large cities and smaller, have proved by performance tests and cost analysis the fitness of Dodge Brothers Motor Coaches for present-day service.

Powerful, smooth, flexible, six-cylinder engines and sturdy four-speed transmissions assure time-saving acceleration in traffic or on the open road. Internal-expanding, hydraulic four-wheel brakes provide deceleration that is safe and certain. Thus, operators are enabled to maintain higher scheduled speeds. Their investment in equipment need not be as large. Their operating and maintenance costs will be less.

And the comfort, the dependability and the appearances of these modern coaches attract patrons and insure more revenue.

OTOR COACHES

. . . AND YOUR MAINTENANCE COSTS WILL CONTINUE LOW BECAUSE A DODGE BROTHERS DEALER—ONE OF YOUR REPUTABLE LOCAL BUSINESS MEN—CARRIES AN AMPLE STOCK OF REASONABLY PRICED REPLACEMENT PARTS . . .

DODGE BROTHER
MOTOR COACHES

$9.55

See Electric Railway Journal, June, 1929, Page 665.

Per Single Track Foot

No Maintenance In Ten Years

A Track Design
Selected by
An Engineering Commission in 1920
Approved by
The Detroit Engineering Society

Adopted As Standard By The
Department of Street Railways
and Installed as Follows:

8.5 Miles in 1920
34.0 Miles in 1921
4.0 Miles in 1922
11.0 Miles in 1923
5.0 Miles in 1924
4.0 Miles in 1925
4.7 Miles in 1926
1.0 Miles in 1927
9.0 Miles in 1928
15.0 Miles in 1929

AND NOW 18 MILES TO BE INSTALLED IN 1930—

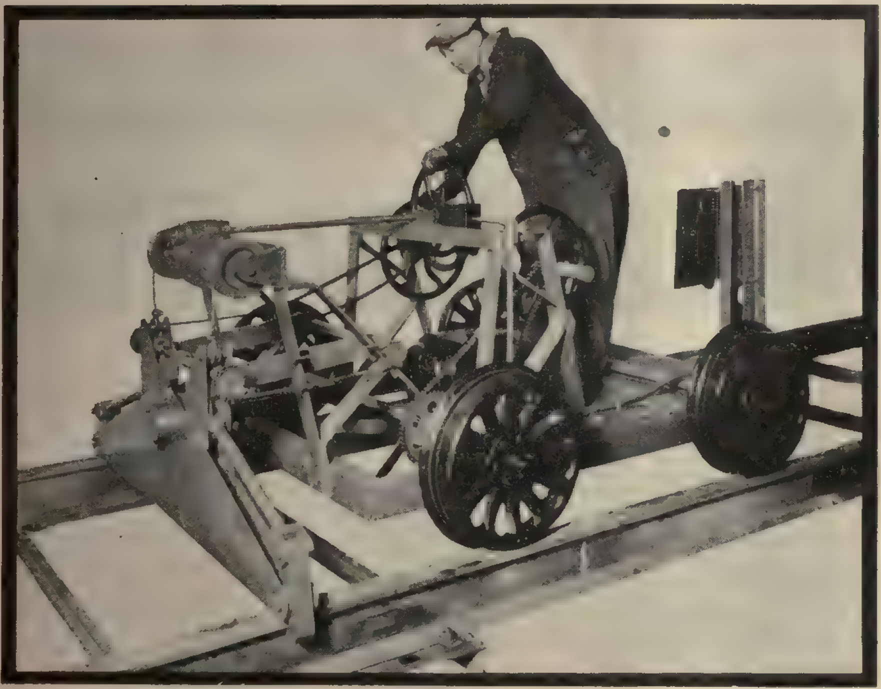
●●IN

IN DETROIT—

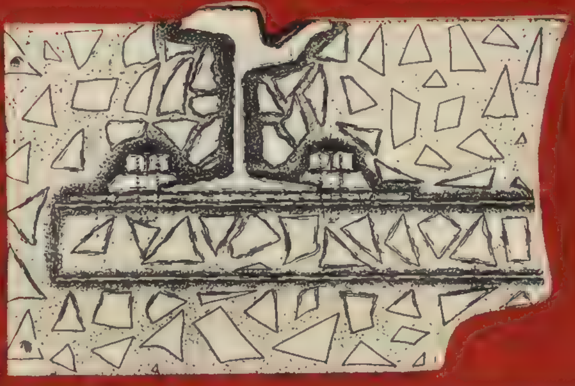
Uniform Paved Track Is Assured by the "MORTAR-FLOW" PRINCIPLE of Vibrating Concrete Around the Track Structure.

INTERNATIONAL STE

DETROIT



THE "MORTAR-FLOW" PULSATOR clamps to both rails. Vibrates whole track structure 5500 times a minute. Concrete is bonded to steel as the cement is forced into every minute crevice. All voids are filled. Entire structure is sealed into a unified monolith.



IE COMPANY CLEVELAND
OHIO

READ

To Help With

STANDARDIZATION

On April 21, 1861, a special committee was appointed by the Franklin Institute to study the problem of standardizing screw threads.

The first report was made December 1, 1864, in which was recommended the thread system designed by William Sellers and since known as the U. S. Thread.

These accomplishments were brought about because of the *need of standardized threads by American Railroads for development of lines and equipment.*

The National Screw Thread Commission, The American Society of Mechanical Engineers, the Society of Automotive Engineers *with the cooperation of prominent manufacturers of specialized thread products* have carried forward the work.

Today terminology, symbols, tools, tolerances, fit, gages, all are standardized. Thousands of sizes and styles have been eliminated. Millions of dollars have been saved by manufacturers and users.

The Cincinnati Car Corporation

CINCINNATI, OHIO, U. S. A.

Y

ogram of Standardization

IT LONG has been the custom of the Electric Railway Industry to specify in detail the type of rolling stock for their lines. Why? Simply custom.

Well known is the fact that to have any product specially built increases the cost. In an effort to reduce this expense standardization has become the order of the day.

From a background of practical operating experience, the builders of Cincinnati cars view the Electric Railway Industry as a whole. From our experience and study we are convinced that greater standardization of street cars is possible.

Standardization will enable manufacturers of street cars to put their shops on a production basis and build more economically. This, in turn, means that the Electric Railway Properties benefit from the economies effected; can procure rolling equipment at less cost and thus materially reduce the capital investment.

Because of a keen understanding of operating conditions and many years' experience as car builders the management of the Cincinnati Car Corporation is unusually well qualified to help the individual operator with a program of standardization.

Public Service
Coordinated Transport
System on the streets
of Newark, N. J.

Johnson Fare Systems
will *register*—

Nickels and Dimes
Dimes, Tokens, and Half Fare Tokens.
Nickels, Dimes, and Quarters.
Any of the above coins or tokens singly.
Zone Fares.

Johnson Electric Fare Systems
can now be

Leased or
Purchased

TERMS UPON REQUEST

Over 7,000 Johnson Automatic Electric Fare Boxes have been placed in service in the last 3 years.

JOHNSON FAR
4619 Ravenswood Ave., CHICAG

Coordinated Transport of New Jersey fully equipped with 3,000 Johnson Electric Fare Boxes

Isn't it significant that this, the largest coordinated transportation company in the country, and undoubtedly one of the most progressive, has adopted Johnson Electric Fare Systems for both bus and street car operation.

Over 1600 buses and 1400 street cars on this vast system are equipped with Johnson Type J Fare Boxes.

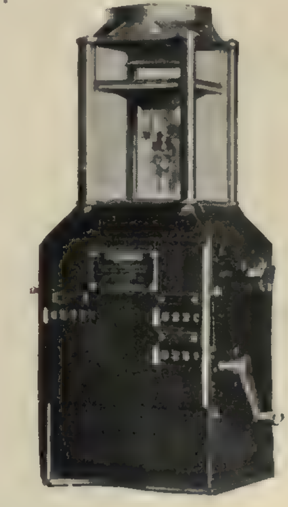
The fact that the new type J Fare Box is available in two and three coin registers makes them adaptable to any fare collection system. You can have the advantages of Electric Fare collection no matter what system you use.

Electro-magnet type of fare box—NOT motor driven; no drain on battery.

will

Increase Revenue
Speed up Loading
Facilitate Inspection
Give rapid Accurate accounting
Reduce Accident Hazards

WRITE FOR further information, including a list of other prominent operators and the saving they have found possible.



BOX COMPANY
EW YORK W. 61st Street

Over 60,000 Type D Boxes have been placed in service during the last 20 years.

An improved *ENGINEERING DEVELOPMENT* in upholstery leather

* * *

PUBLIC UTILITIES CHROME

A genuine leather seat upholstery developed by Blanchard Bro. & Lane is now being supplied to Public Service Coordinated Transport of New Jersey. This is the largest bus operating company in the country whose very size makes it necessary to have intimate knowledge of the modern quality and character of each material required where the maximum comfort, durability and smart appearance are paramount.

Since the beginning of the bus industry, Blanchard Bro. & Lane has been furnishing genuine leather for seats. Public Utilities Chrome, the finished product, is the result of many years' experience in the production of high grade upholstery leather coupled with actual knowledge of the needs of transportation.

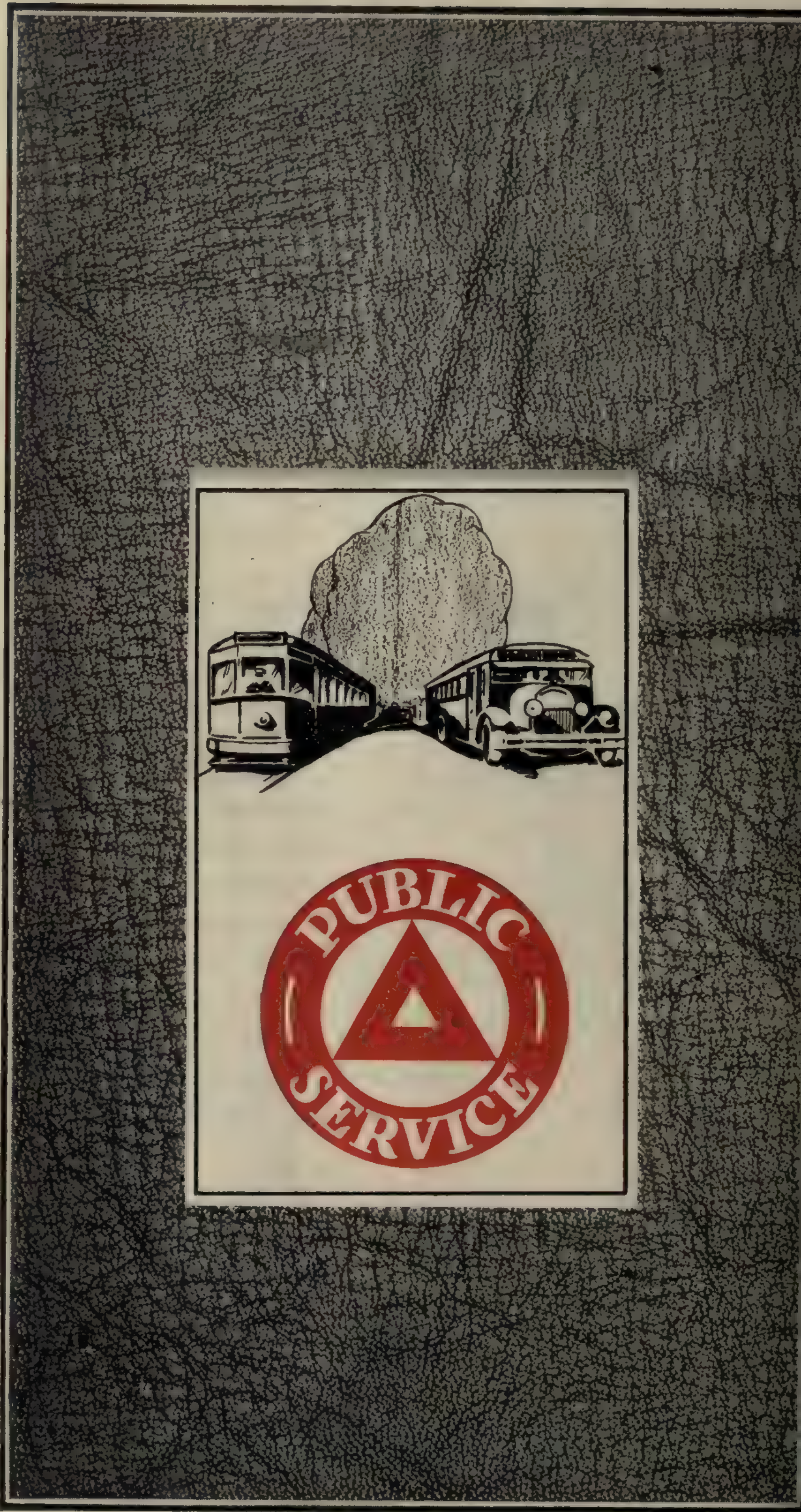
Practically all upper shoe leather is Full Chrome tanned which after many years has proven to be the strongest and toughest leather made. Public Utilities Chrome upholstery leather has been developed along the same principle and the maximum of strength, durability and softness has been exemplified to the great fraternity of discreet buyers.

Samples of this new leather are now ready. It should receive consideration for new rolling stock or aid in modernizing present equipment. Seat and body builders will be glad to cooperate.

* * * *

Buffalo Brand
Velveau-Velcuir
Devon

All colors and grains from imported and domestic hides.



Established 1860

BLANCHARD BRO. & LANE

Tanners and Finishers
NEWARK, N. J.

Sales Representatives

C. S. Withrow
Connersville, Indiana

Ryan Sales Engineering Co.
82 Lathrop Ave., Detroit, Mich.

W. M. Lalor Co.
20 E. Jackson Blvd., Chicago, Ill.

Geo. Faustmann
1020 Chestnut St., Philadelphia, Pa.

YOU
OOD TIE
USERS

HERE'S SOMETHING YOU'VE MISSED

IN SOLVING ON
OTHER VITAL ONE'

IT is a recognized fact that electric railway track engineers are divided into two schools of thought. No. 1—those who adhere to wood ties. No. 2—those who prefer rigid steel and concrete construction.

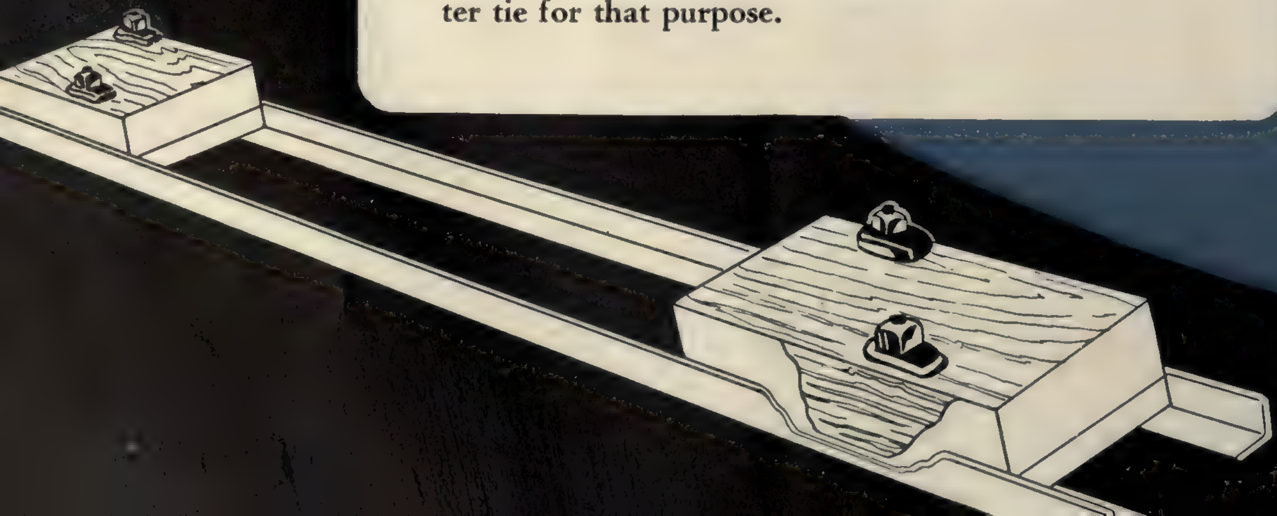
The first class have under their jurisdiction more than 38,000 miles of the 43,400 miles of electric railway track in the United States and Canada.

These engineers believe that passage of a car over the rail produces a vibration in the rail, which must be absorbed by the track structure. Their choice of an absorbing medium is wood—in the crosstie—and flexibility in the ballast.

YOU BELIEVE 50% OF THE DAYTON STORY

In other words, wood tie users have already accepted 50% of the Dayton story—the need for absorbing this vibration.

With those who use wood ties in open track, we have no difference—cost considered, there is no better tie for that purpose.



PROBLEM...THREE
ARE LEFT UNSOLVED

THE UNSOLVED PROBLEM

But use of wood ties in paved track, while it solves one problem, leaves certain other very vital problems unsolved. These problems have haunted the railway industry since the beginning—have cost millions of dollars.

1. It is impossible to spike into wood, tight enough to prevent some loosening of the rail.

2. Ballast cannot be placed so it will not settle. This is corrected in open track by constant work on ballast. It cannot be corrected in paved track.

3. Wood will not bond with concrete to possess any holding power. Hence, a structure of wood ties and concrete grout is merely begging the question—it is only a little more effective than gravel ballast.

4. Compressible ballast accentuates wave motion of the rail. Locomotives—on this account are said to continually climb a one per cent grade when running over level track.

These four problems are of too much importance to remain unsolved. They are costing the industry too much for track and power.

How Dayton meets these problems

Dayton Ties give you first, that which you consider essential—a treated white oak block under the rail.

They add a further vibration absorbing feature in an asphaltum and fibre layer under the block—confined within a steel pan.

These two features take care of your desire to absorb harmlessly, the rail vibration.

Dayton Ties provide bolted rail clips, screw threaded, steel to steel. They cannot pull out or get loose. Takes care of problem No. 1.

Dayton Ties provide a perfect re-enforcing bond with concrete. With the concrete, they produce a strong homogeneous unified structure—there is no ballast to settle—no way for the tie to part company with the concrete—problems 2 and 3.

Dayton Tie Method with its perfectly controlled rail deflection reduces rail wave to a negligible degree. Problem 4.

RESULTS...SEE LAST PAGE.....

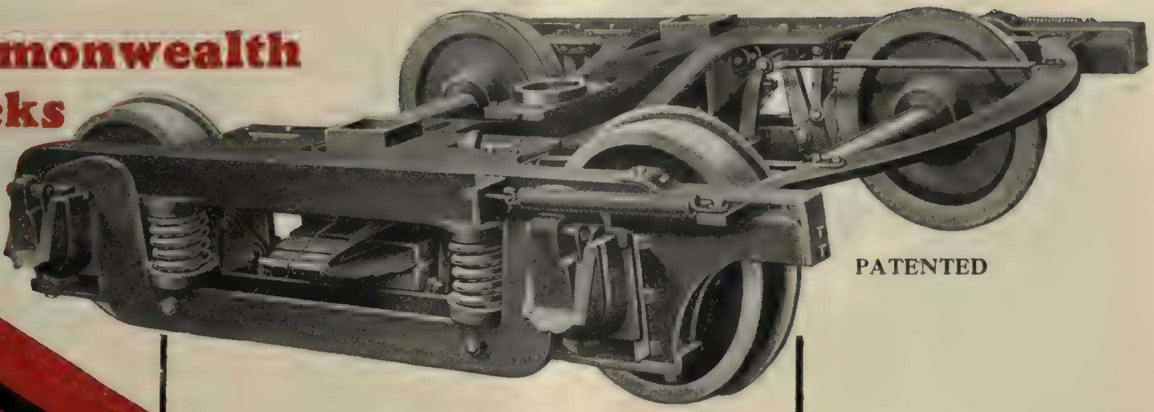
RESULTS

The results are read in first cost of construction, in years of life, in cost per mile per year. We invite your inspection of these results—there is a nearby property where you can. Let us tell you where it is.

Dayton Mechanical Tie Co.
Dayton, Ohio

Double Track Crossing—Fifth and Main Streets, Dayton, Ohio. Installed with Dayton Mechanical Tie foundation, 1922. Sustained heaviest city traffic. Photograph taken 1930—eight years and still perfect.

Commonwealth Trucks



Cast steel frame, including cross transoms and pedestals are

One strong unit

The excellence of their design, material, and workmanship; their structural simplicity and strength, have commended Commonwealth Trucks to the engineers of many great American Railways. The performance of these trucks under all operating conditions, without repairs or costly maintenance, has firmly established them with these railways as standard. Designed for both street car and interurban service. Pedestals cast integral with frame are machined and protected from wear by renewable, hardened spring steel liners.

General Steel Castings Corp.

EDDYSTONE, PENNA. GRANITE CITY, ILLINOIS

Less
maintenance
wear
cost

Commonwealth Trucks . . . .

East *and* West, they

The Northwestern Pacific Railroad Company will have 19 St. Louis Cars operating over the electrified zone of its line, between Sausalito and San Rafael in Marin County, California. They are motor coaches seating 108 passengers equipped with St. Louis Cane Seats. Cars are all steel construction, railway standard design. Original order was for 10 cars and a repeat order for 9 more followed.

FROM every part of the country, where modern transportation is wanted to attract passengers and increase revenues, utilities come to St. Louis Car Company for the newest and most modern in car engineering.

The dominating position of the St. Louis Car Company today is due as much to engineering skill as to the high quality of workmanship that has characterized its products for many years.

For, regardless of type or style, St. Louis Car Company is equipped to build into its cars the elements of comfort, easy riding, speed, that attract passengers as well as durability and maintenance-free service.

In Chicag
they use St
ley Buses.
came necess
transportatio
some of the
ing districts
it was decid
siderable st
trackless tr
most econom
cient type
the partic
Naturally, t
Car Comp
largely in
this equip
usually does
and dependa
manded St
less Trolley
build up re
cago

And Los Angeles
comes to St. Louis for its low level car. With a seating capacity of 46, this car is 48 feet long, over-all. Body is mounted on St. Louis Car Company E. I. B. trucks. DeLuxe leather upholstered seats are used in these cars. St. Louis Car Company is now building two model cars of same dimensions and capacity except end entrance and center exit.

St. Louis Car Co.

ST. LOUIS Quality Cars MISSOURI

come to St. Louis for Quality Cars

ST. LOUIS CAR CO.

Birthplace of the Safety Car

In Lorain—

recognizing the need for modern equipment to attract passengers, they turn to the St. Louis Car Company for 10 cars of new and modern design. These are light weight, single end, double truck, one-man, two-man cars, equipped with brown leather upholstered bucket type St. Louis Car Company seats and mounted on St. Louis Car Co. E. I. B. typc trucks.

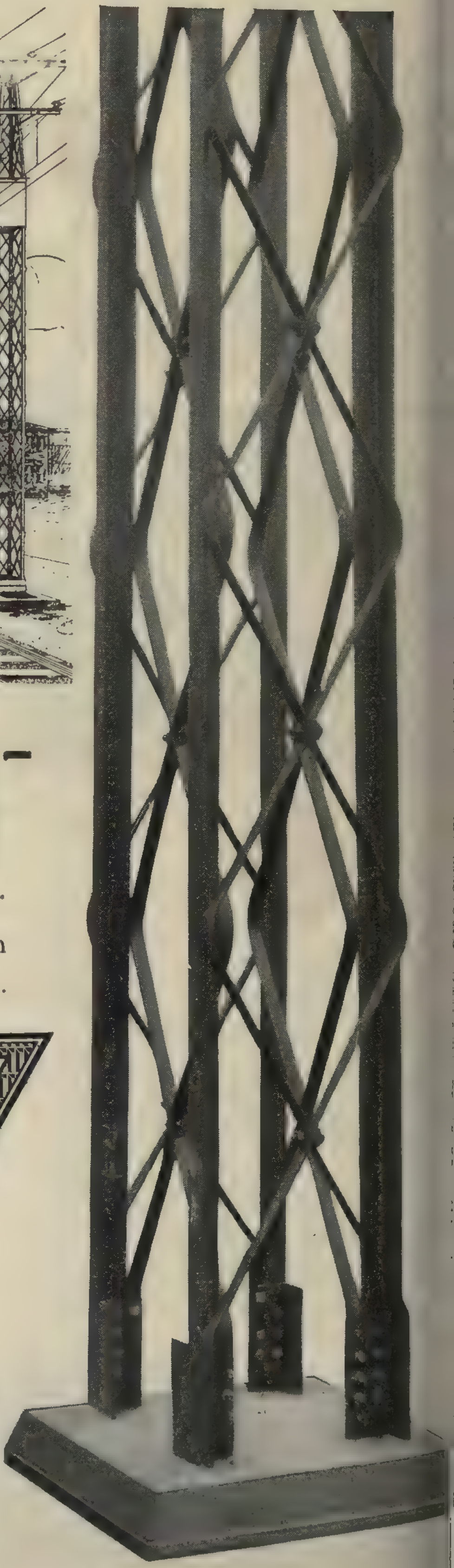
klahoma City—

s an equipment modernization pro-
which includes the purchase of 10
. Louis Trolley Cars of the type
most satisfactory in the city. Here
he economy and revenue-attracting
of modern equipment has been
ed as well as the capacity of the
s Car Company for doing the best
nd a repeat order for 20 additional
cars has been placed.

klahoma City recognizes the dom-
position of the St. Louis Car Com-
d the quality of workmanship and
ing it implies.

Walter Bates Steel

EXPANDED SQUARETRUS



SQUARETRUS Construction–

for Strength, Appearance, Economy, Efficiency

More lbs. of strength for lbs. of weight than any other design.

"SQUARETRUS" Poles are made from four main pieces. Each corner leg angle is intact with one set of expanded lacing.

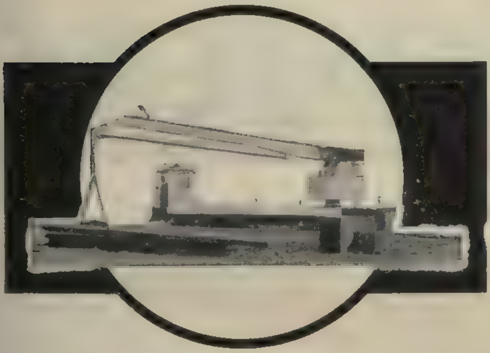
Erection of structures is obviously a simple matter, easily kept at a minimum expense.

Very few bolts; examine the cut carefully for detail of construction. Tabulated data gladly furnished.

WALTER BATES
STEEL
FLOOR GRATING
SUBSTATIONS
TOWERS
POLES
THE SEAL OF WALTER BATES

**WALTER BATES STEEL
CORPORATION
GARY INDIANA**

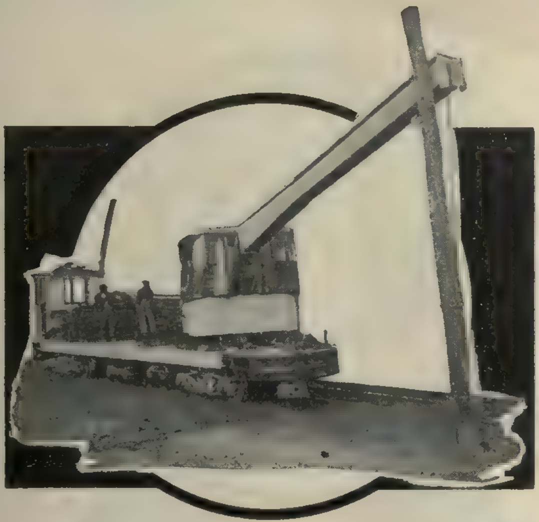
IT'S DIFFERENT WITH DIFFERENTIALS

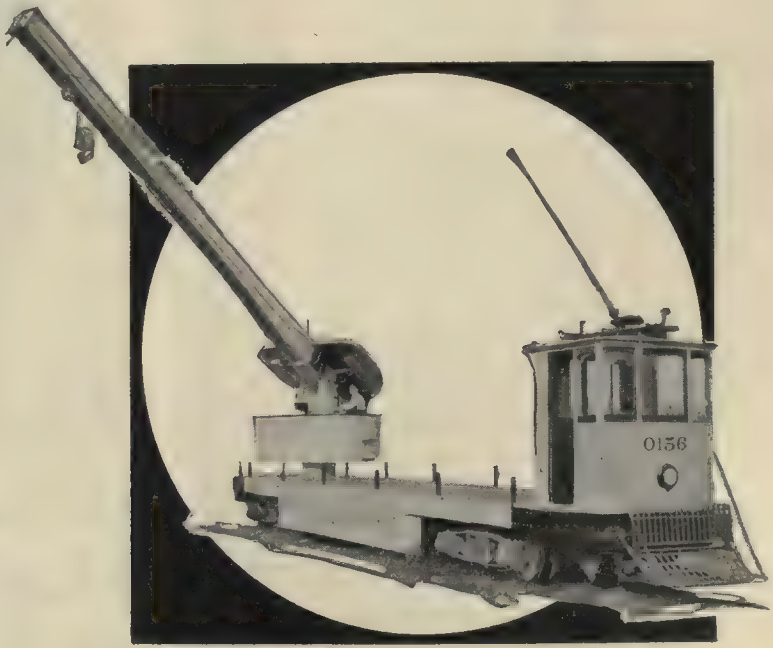


FOR example, the Differential Crane Car. Fast and safe, it conforms to Electric Railway clearances, does not obstruct traffic on adjacent tracks. One man from a revolving turret controls every operation.

Teamed up with Differential Dump Cars, Differential 3-Way Truck Bodies and Clark Concrete Breakers, work goes with a snap. More is accomplished, costs are less.

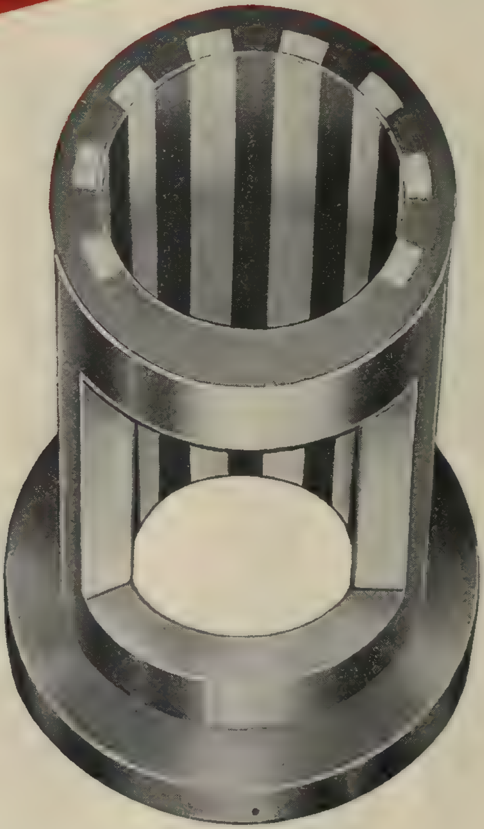
We can prove Differentials are different by a few comparative figures. Write for details.





The
Differential
Steel Car Co.
Findlay, Ohio

50 YEARS OF EXPERIENC



Vigne

Bimetallic Armature Bearing

AS PRODUCED THE

Vigne

Bimetallic Armature Bearing

THE Vigne Double Duty Bimetallic Armature Bearing now becomes another outstanding NATIONAL Product, and an asset to the Electric Railway Industry.

We have never ceased to be active in seeking ways and means to lower maintenance and increase the economy of electric railway operation.

The new "Bimetallic" is an example of the efforts we have made and are continually making to better serve you.

This latest improvement is a distinct departure from former ypes of Armature Bearings, and has been proven highly successul. It will last longer—requires less attention—is less xpensive.

An ideal combination of Bronze- and Lead-Base Babbitt Metal trips in contact with the shaft.

uring test installations "Vigne Bimetallic Armature Bearings" ave given 160,000 miles' service on the original applications, nd are still in good condition and in active use.

ew savings in shop costs, labor, elimination of expensive abbitt Metal for linings, and tying up of motors can be yours. nvestigate the "Bimetallic."

rite for explanatory booklet—"How to Reduce Operating osts of Electric Railways."

NATIONAL
BEARING METALS CORP.
ST. LOUIS, MO.

w York, N. Y. Jersey City, N. J. Pittsburgh, Pa.
eadville, Pa. Portsmouth, Va. St. Paul, Minn.

List of Commodities we manufacture

- **Brass, Bronze, Copper, Lead, and Aluminum Castings of all kinds.**
- **Axle, Armature and Journal Bearings for Electric Railways.**
- **Locomotive Wearing Parts.**
- **Bushings and Solid Bars.**
- **Standard A. R. A. Car Journal Bearings.**
- **Special Size Car Journal Bearings.**
- **Solders: Bar, Wire, Drop Cake, and Ribbon.**
- **Babbitt Metals—all grades.**
- **Bearings for Steel, Paper, Lumber and Sugar Mills.**
- **Miscellaneous Castings in all non-ferrous metals.**
- **Trolley Wheels and Harps.**
- **Pig and Ingot Metals.**
- **Blast Furnace Castings.**
- **Copper Tuyeres.**
- **Bosch Plates.**
- **Etc.**

WINNERS

"for excellence in editorial work"

WE ARE PLEASED TO ANNOUNCE THAT

Morris Buck

and

George J. MacMurray

of *Electric Railway Journal's* Editorial Staff have been awarded the A.B.P. ("Associated Business Papers, Inc.") prizes for 1929, as follows:

2nd Prize to Mr. MacMurray in the contest for

"BEST EDITORIAL, judged by importance of subject, clearness of style, sound reasoning and power to influence."

Awarded for "Editorial in February 16, 1929, issue of *Electric Railway Journal,* entitled 'The Subsidy as a New Shibboleth.'"

2nd Prize to Mr. Buck in the contest for

"BEST ARTICLE, SERIES OF ARTICLES OR NEWS REPORT, judged broadly on the basis of timeliness, accuracy, thoroughness, originality, clearness of expression and usefulness."

Awarded for "Series of articles published in *Electric Railway Journal* during the year 1929, entitled 'Result of Industry-Wide Survey of Electric Railways.'"

This is the first time in the history of the Associated Business Papers Awards that any one publication has won two awards in a single year. And in 1927, *Electric Railway Journal* won the first award for having rendered the most outstanding editorial service to its industry, making three awards in all won by *Electric Railway Journal* for editorial excellence during the past three years.

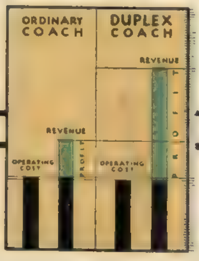
ELECTRIC RAILWAY JOURNAL

he NEW PICKWICK

53 Passenger DUPLEX OBSERVATION COACH

Is the greatest stimulant to motor coach travel ever offered the industry. Makes service more comfortable and easier to render.

Increases the operator's potential profit 300%.



A DUPLEX PAY LOAD

53 PASSENGER CAPACITY . . . BUILT OF DURALUMIN AND STEEL . . . STAGGERED COMPARTMENT CONSTRUCTION . . . LAVATORY ABOARD . . . BUFFET OPTIONAL . . . THE MOST COMFORTABLE AND SAFE COACH ON THE ROAD . . . A POWERFUL ADVERTISEMENT OF YOUR

The history of the growth of Motor Coach Transportation
the history of improved equipment.

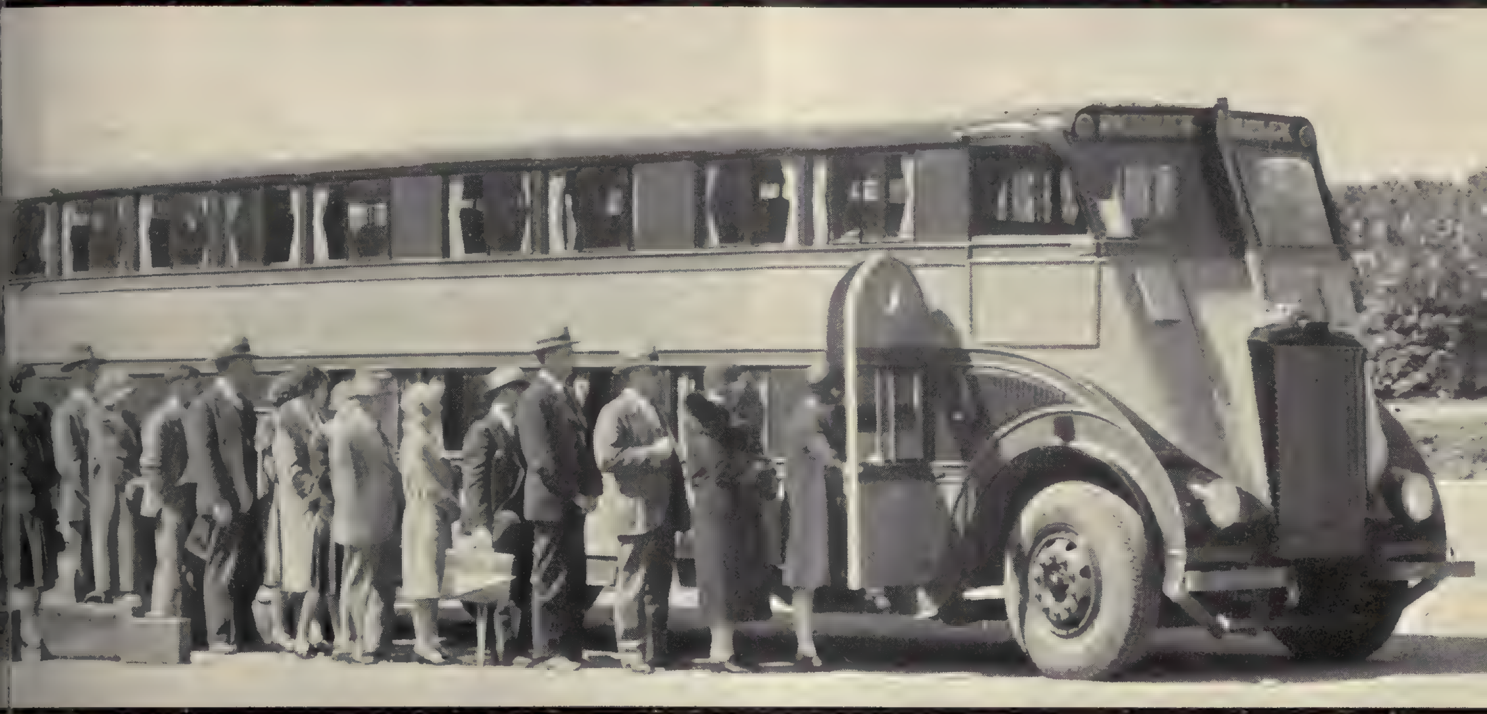
As coaches have become more comfortable, terminals m
modern, and service more reliable, bus transportation
grown till it today ranks as the great public carrier.

In this respect, the new 53-passenger Pickwick Duplex Ob
vation Coach is the greatest contribution ever offered
industry. Built of duralumin and steel along the lines of
famous Pickwick Nite-Coach, it offers the public the grea
possible comfort and convenience.

Duplex uses the unique staggered compartment construct
It is both compact and roomy. Passengers enter either le
by a single step. Two-thirds of the seats are on the m
desirable upper level. A lavatory is carried. A buffet
dining service is optional. There are eight compartments
family travel. The hot water heating system, the ventila
system, the special lighting, the large baggage capacity,
portable tables, the special reclining seats — all contrib
to the passengers' well being. The coach rides easily
steers easily. Its rigid metal honeycomb frame, its do
metal walls, its low center of gravity, its front-roof exhaus
upper level driver's compartment — make it the safest co
on the road.

Duplex is a powerful stimulant to all motor coach trave
use on your lines it is the best possible advertisement of

53 PEOPLE — COUNT THEM



business. It will convert many to motor coaches who have never used them before.

Duplex makes service more dependable and easier to render. It's designed and built from the operator's standpoint, by motor coach operators. All parts of both body and chassis are easily accessible and easy to service. The whole power plant can be replaced in fifteen minutes. This is in itself one of the greatest advances ever made in motor coach practice. It eliminates the chief cause of motor coach failure. Other major parts are similarly easy to remove or replace.

Finally Duplex increases your profit. It cuts operation and maintenance costs. It is no larger (8 feet wide, 9 feet 10 inches high, 33 feet long) nor heavier (17,000 lbs. empty, 25000 lbs. loaded) and costs no more to operate (approximately 29 cents per mile as indicated by past experience) than many coaches of far smaller capacity. The use of metal instead of wood gives long life and cuts depreciation to a minimum.

Duplex is capable of a gross return of 75 cents per mile. This high increase in revenue, without increase in operating cost and with an actual decrease in maintenance and depreciation expense increases the potential profit over 300% above ordinary equipment.

Put Duplex on your schedules and both your business and your profits will grow.

BUSINESS . . . DESIGNED AND
BUILT FOR OPERATORS, BY OPER-
ATORS...EXCEPTIONALLY HIGH
ACCESSIBILITY, LOW MAINTE-
NANCE COST, LONG LIFE . . .
REMOVABLE POWER PLANT . . .
NO INCREASE IN WEIGHT, SIZE
OR OPERATING COST . . . 300%
INCREASE IN POTENTIAL PROFIT

THRU THE REAR WHEELS

COMPARTMENT

LAVATORY

REMOVABLE MOTOR

INTERIOR

If you attend the AERA Convention at San Francisco you can see Duplex at the Union Stage Depot (5th and Mission Streets). Better still, stop off at Los Angeles, and see Duplex being made. If you do not come West, write at once for complete specifications and details. Duplex is being put into operation by various lines throughout the country as fast as our production facilities permit.

PICKWIC
COACHES
DAY OR NIGHT
CLEAN COMFORTABLE ECONOMICAL TRAVEL

PICKWICK MOTOR COACH WORKS, Ltd.

(Builders of Pickwick Nite-Coach)

INGLEWOOD (Los Angeles) CALIFORNIA

Eastern Representative: Chester G. Moore, 100 N. La Salle St., Chicago

TIMKEN BEARING EQUIPPED

Is Keeping Electric Railways Up With *the* Times

Electric railway operators who have put their cars on a Timken-equipped basis are not worrying about the future. They have found a way to keep electric railway profits well abreast of the times.

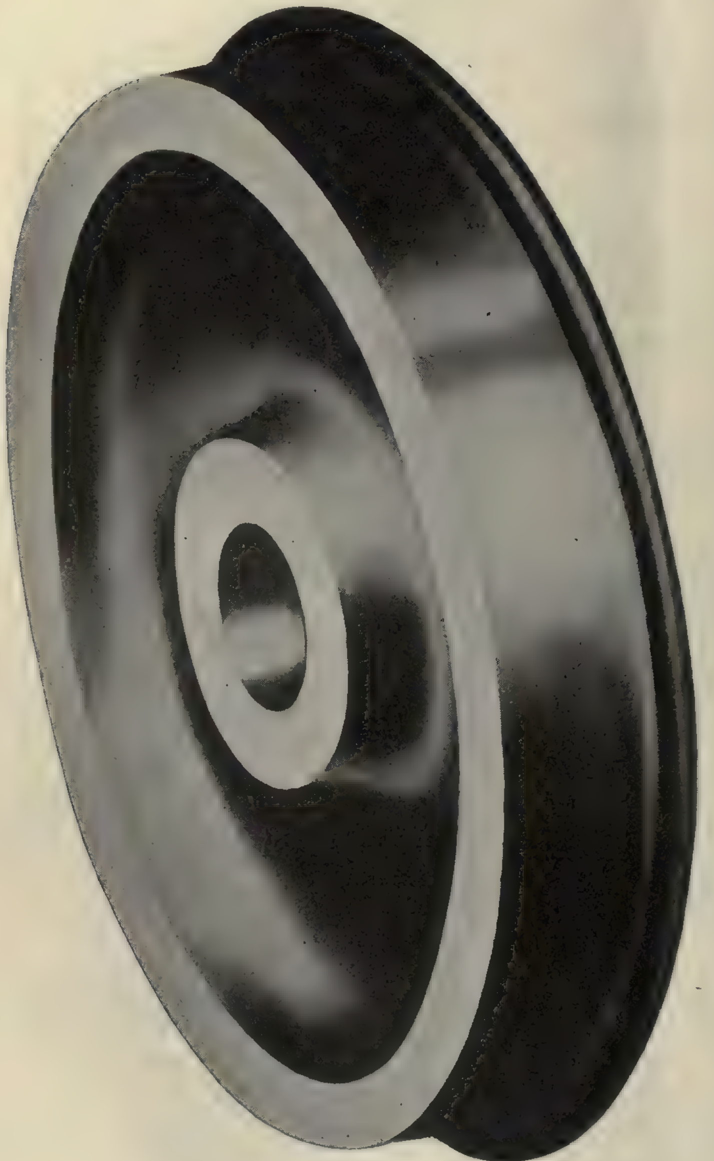
The field for electric railway operation is broader than it ever was. It's a question of making electric railway travel as efficient and as attractive as newer methods of passenger transportation, and of revising operating and maintenance costs in accordance with present day necessities.

The most urgent need is for faster running schedules with greater convenience and comfort for car riders. It is being met by modern Timken Bearing Equipped cars in which speed, easy jerkless starting and smooth joltless running are combined with radically reduced power demands, substantial lubrication savings and greater endurance.

Car builders are naturally anxious to see electric railway transportation thrive and prosper, and they will gladly cooperate with you in bringing your car equipment up-to-date by means of the exclusive radial-thrust carrying combination of Timken tapered construction, Timken positively aligned rolls and Timken-made steel. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* **BEARINGS**

They're *STRONG!* They're *SAFE!* They *LAST!*



Bethlehem Wrought Steel Wheels are ideally suited to the requirements of modern electric-railway service, which makes such severe demands on wheels.

Bethlehem Wrought Steel Wheels have long been known for their stamina, and for their economy, the result of their exceptionally long life and the many thousands of miles of trouble-free service that they give.

Strength, endurance and wearing qualities are worked into Bethlehem Wheels in the making. Each wheel passes through five separate forging and rolling operations. The forging gives the metal density and toughness. The rolling produces a refinement in grain structure throughout the entire wheel. Bethlehem Wheels are virtually immune to crystallization, and the possibility of breakage is reduced to a minimum.

If you investigate you will discover what so many electric railway executives have learned about Bethlehem Wrought Steel Wheels. That they're strong. They're safe! They last!

Your inquiry will receive prompt attention. Write today.

FORGED AXLES. Extreme care is exercised in the manufacture of Bethlehem Axles. Special heat treatment gives them ductility and a high elastic limit. They give excellent service under severe torsional stresses.

BETHLEHEM STEEL COMPANY

***General Offices:* Bethlehem, Pa.**

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

BETHLEHEM
Wrought Steel Wheels

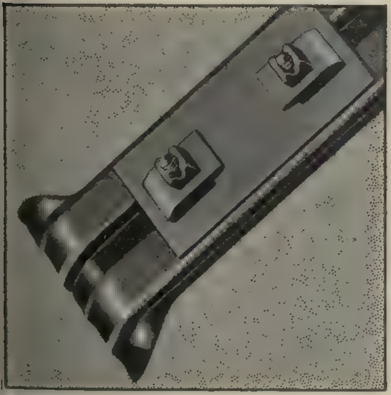
Reduce track construction cost with these Steel Ties

Reconstructed single-track structure with Bethlehem No. 3 Steel Ties.

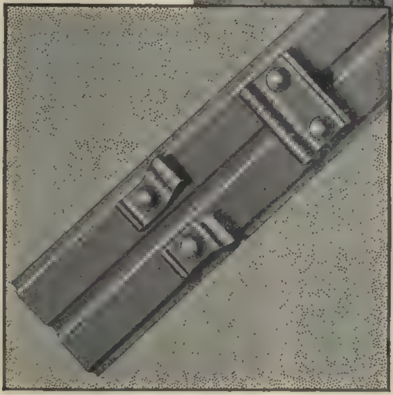
Bethlehem Steel Ties offer many new advantages and economies in street railway track construction. Substantial savings in installation costs are to be had, because of the low first-cost of these steel ties, the simplicity of track laying, the saving in height and the reduction in foundation material and in labor.

Due to the shallow section of these ties, excavation is greatly reduced and there is a corresponding reduction in the amount of ballast or concrete. Actual cost records of track construction jobs show that the use of Bethlehem Steel Ties results in a saving of from 30 to 40 per cent as compared with the use of wood ties. Consideration must also be given to the savings in handling and in distribution costs, due to the shallow, compact section of these steel ties, which reduces bulk in handling.

Bethlehem Steel Ties for street railways are made in two sizes to meet different ballasting conditions and track construction practices. Complete information about Bethlehem No. 3 Steel Tie and Keystone No. 9 Steel Tie will gladly be supplied. Write for literature.



The Keystone Steel Tie No. 9 is a heavy-duty tie with tie plates, bolted rail clips and "whale-tail" ends.



The Bethlehem No. 3 Steel Tie is equipped with a broad stationary clip and two rotating clips.

BETHLEHEM STEEL COMPANY

***General Offices:* Bethlehem, Pa.**

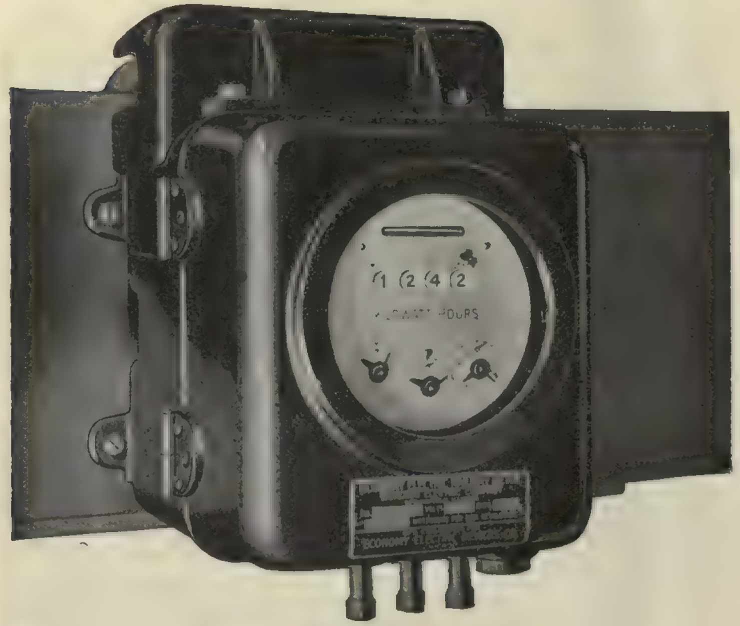
District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu

Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York City

BETHLEHEM
Steel Ties

ECONOMY METERS



Economy Electric Railway Meter

for Electric Railways Gas Rail Cars and Electrified Steam Roads

A rugged, reliable device now standard on over 200 properties. Furnishing a guide and monitor for the operator. Assisting him to determine most economical methods of operation.

An accurate, dependable metering unit supplying valuable engineering data.

An automatic method of determining inspection intervals, based upon work actually accomplished by each individual motive power unit.

Economy Gasoline Vehicle Meter

for Buses, Trucks and Rail Cars

A rugged device that will not interfere with the operation of the vehicle. Serving as a guide to good operation by measuring gasoline consumption of each driver.

A means of determining not only operating efficiency of drivers but also condition of power plant.

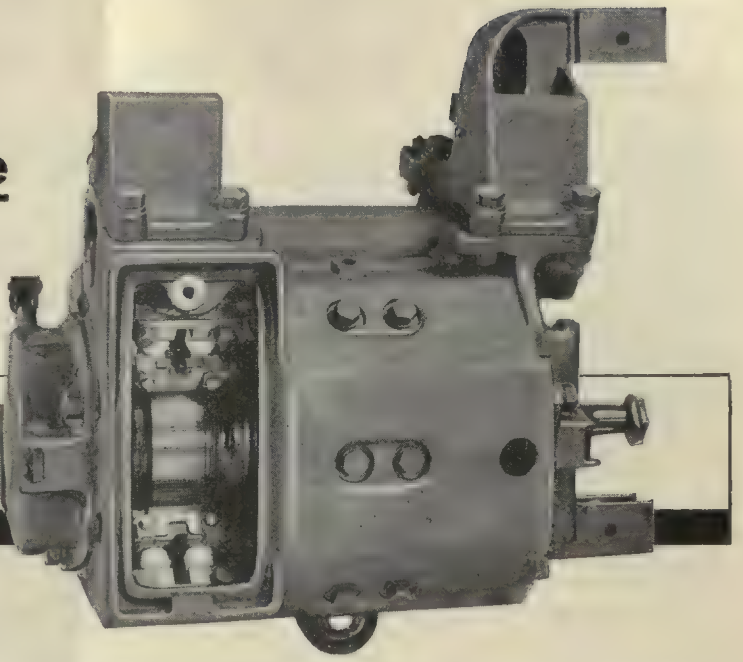
An engineering device supplying data for use in determining types of equipment, schedules, etc.

Economy Electric Devices Company

37 W. VAN BUREN ST., CHICAGO

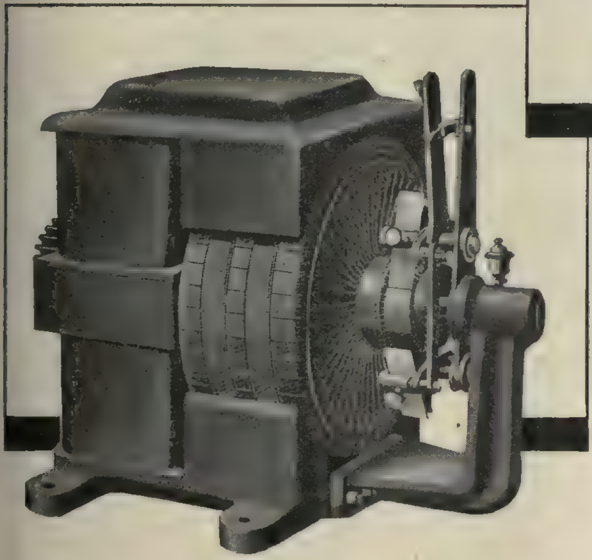
Sangamo Economy Watthour Meters
Peter Smith Heaters
Haskelite and Plymetl
Peter Smith Reverse Flow Car Ventilating System
Lang Bus Bodie
Economy Gasoline Vehicle Meters

the brush that made electric railways



Bottom view of a modern interpole railway motor showing position of brush holders. Only the highest-quality carbon brushes will meet the demands of modern high-speed traction.

■



Early Van Depoele motor for electric railways. It was equipped with two sets of metal brushes, one set for operation in either direction of rotation. Notice levers used to raise and lower the brushes as required.

IN 1894 ELIHU THOMSON, one of the country's most eminent electrical engineers, published an article from which the following is quoted:

"It is, I think, true that no single thing has had a greater or more direct influence upon the technical success of electric railway machinery than the introduction of the carbon brush as a substitute for the various forms of metal brush, many forms of which had been tried previously on railway motor commutators but without even the beginning of success. . . . It came about in this way. . . .

"We had been trying to use . . . various forms of copper and other metal brushes, all of which, however, had soon been condemned as either quite worthless for the purpose or so nearly worthless as practically to be so. A discussion of the matter between Mr. Van Depoele and myself . . . led him to remark in substance: 'I have used a plate of carbon as a brush on a stationary motor, which carbon brush worked well, and I think it might answer the purpose here.' . . .

"The trial was made and was at once so eminently successful that scarcely any time elapsed before the metal brush became a thing of the past."

Carbon brushes, like railway motors, have undergone marked development since the foregoing words were written. The development of the motor is clearly depicted in the illustrations. The early Van Depoele motor with its two sets of brushes — one set for either direction of operation — is in striking contrast with the modern, interpole railway motor by its side. Enclosed frame, compact design, forced ventilation and high commutator speed place a heavy burden on the brushes, but brush manufacture has kept pace with the increasingly heavy demands. The railway brush of today is a symbol of sturdy dependability.

National Pyramid Brushes are backed by over fifty years' experience of National Carbon Co., Inc., in the manufacture and application of carbon products.

Systematic inspection and maintenance of brushes, commutator and brush holders insure longer brush life, more satisfactory performance and greater machine efficiency.

To avoid expensive shut-downs, anticipate your requirements for replacement brushes.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division
SILVER STRAND
CABLE
TRADE MARK REGISTERED
Cleveland, Ohio

Branch Offices and Factories
New York Pittsburgh Chicago Birmingham San Francisco

LEAD IN ELECTRIC RAILWAY SERVICE

One of a Fleet of 115 Whites in the Service of The Virginia Electric and Power Company

102 Railways Operate 3,256 Whites in Fleets of Ten or More Each . .

ELECTRIC Railway operators since the earliest days of motor transportation have shown a marked preference for White Truck and Bus equipment. The most successful companies build their truck and bus fleets with Whites. One hundred and two railway operators use 3,256 Whites in fleets of 10 or more each. Scores of additional railways operate fleets of less than 10 Whites. They know White dependability and economy. *Their experience is your safest guide in buying truck and bus equipment.*

Fleets of 10 or More Whites in Electric Railway Service

Alabama Power Company	11
American Commonwealth Power Corporation	11
American & Foreign Power Co. Inc.	11
American Power & Light Company	21
Arkansas Power & Light Company	10
*Associated Gas & Electric Company	33
Baltimore Coach Co.(United Rys. & Elec. Co.)	26
Birmingham Electric Company	19
Blue Ridge Transportation Co. (Potomac Edison Co.)	17
Boston Elevated Railway Company	148
Brooklyn & Queens Transit Corporation	32
Carolina Coach Co.(Southern Cities Utilities Corp.)	17
Carolina Power & Light Company	15
Central Illinois Public Service Co.	11
Central Maine Power Company	15
Chicago, N. Shore & Milwaukee R. R. Co.	40
Chicago Surface Lines	21
Cleveland Railway Company	160
*Commonwealth Power Corporation	13
Community Traction Company	32
Connecticut Company	30
Cumberland & Westernport Transit Co.	11
Des Moines City Railway Company	10
Dominion Power & Transmission Co.	15
Duluth Street Railway Company	10
*Electric Power & Light Corporation	21
Emprezas Electricas Brazileras	13
*Engineers Public Service Company	17
Florida Power & Light Company	36
Gray's Harbor Railway & Light Co.	23
Illinois Power & Light Corporation	23
International Utilities Corporation	16
Interstate Public Service Company	14
Lewiston Transportation Co. (Lewistown & Reedsville Electric Ry. Co.)	15
Los Angeles Railway Corporation	38
Louisville Railway Company	11
Manila Electric Company	13
Memphis Power & Light Company	13
*Middle West Utilities Corporation	40
Middlesex & Boston Street Railroad	98
*Midland Utilities Company	12
*Milwaukee Electric Railway & Light Co	36
Mississippi Power & Light Company	12
Monongahela West Penn Public Service Co.	19
Montreal Tramways Company	13
*National Power & Light Company	18
*National Public Service Corporation	12
*New England Power Association	17
*New England Public Service Company	11
New Orleans Public Service, Inc.	76
New York State Railways	65
Newburg Public Service Company	16
*North American Company	10
Northern Ohio Power & Light Company	119
Northern States Power Company of Minn.	25
Northern Texas Traction Company	13
Ohio Public Service Company	17
*Pacific Electric Railway Company	80
Pacific Gas & Electric Company	47
*Penn Central Light & Power Company	12
Penn-Ohio System	125
Philadelphia & West Chester Traction Co.	13
Pittsburgh Motor Coach Co.(Pbgh.Rys.Co.)	20
Portsmouth Public Service Company	15
Power Corporation of Canada, Ltd	17
Public Service Company of Colorado	23
Public Service Company of Oklahoma	16
Public Service Co-ordinated Transport Co.	236
Public Service Electric & Gas Company	189
Puget Sound Power & Light Company	12
Rio de Janeiro Tramway Light & Power Co	39
St. Louis Public Service Company	53
Safety Motor Transit Corp.(Roanoke Ry. & Electric Co.)	15
Saginaw Transit Company	10
San Antonio Public Service Company	27
San Francisco Municipal Railway	15
San Joaquin Light & Power Corporation	22
Shawinigan Water & Power Company	22
Sioux Falls Traction System	18
Southern California Edison Company	27
Southern Pacific Company	13
Southwestern Bus Company (Cleveland Southwestern Ry. & Lt. Co.)	16
Southwestern Gas & Electric Company	10
*Southwestern Power & Light Company	13
*Standard Gas & Electric Company	45
*Stone & Webster Interests	20
Tennessee Electric Power Company	23
Toronto Transportation Commission	16
Transportation Holding Co., Inc.	11
Twin City Rapid Transit Company	31
Union Railway Company of New York	10
Union Traction Company of Indiana	20
United Electric Railways Company	66
*United Rys. & Electric Co. of Baltimore	35
Virginia Electric & Power Company	115
Virginia Public Service Company	10
*Washington Railway & Electric Company	16
*West Penn Electric Company	12
J. G. White Engineering Corporation	42
Wisconsin Michigan Power Company	20
Wisconsin Motor Bus Lines (Milwaukee Elec. Ry. & Lt. Co.)	24
Worcester Consolidated Street Railway	14
Total	3,256

*Exclusive of subsidiary or affiliated companies individually listed.

THE WHITE COMPANY, *Cleveland*

WHITE

A COMPLETE LINE OF FOUR AND SIX CYLINDER

TRUCKS

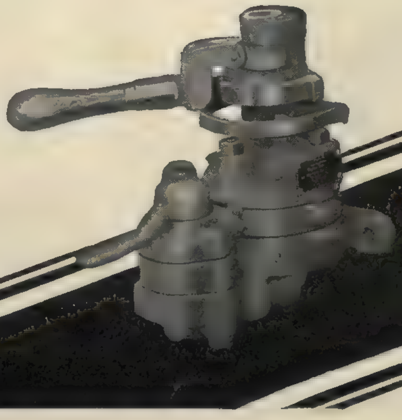
BUSSES

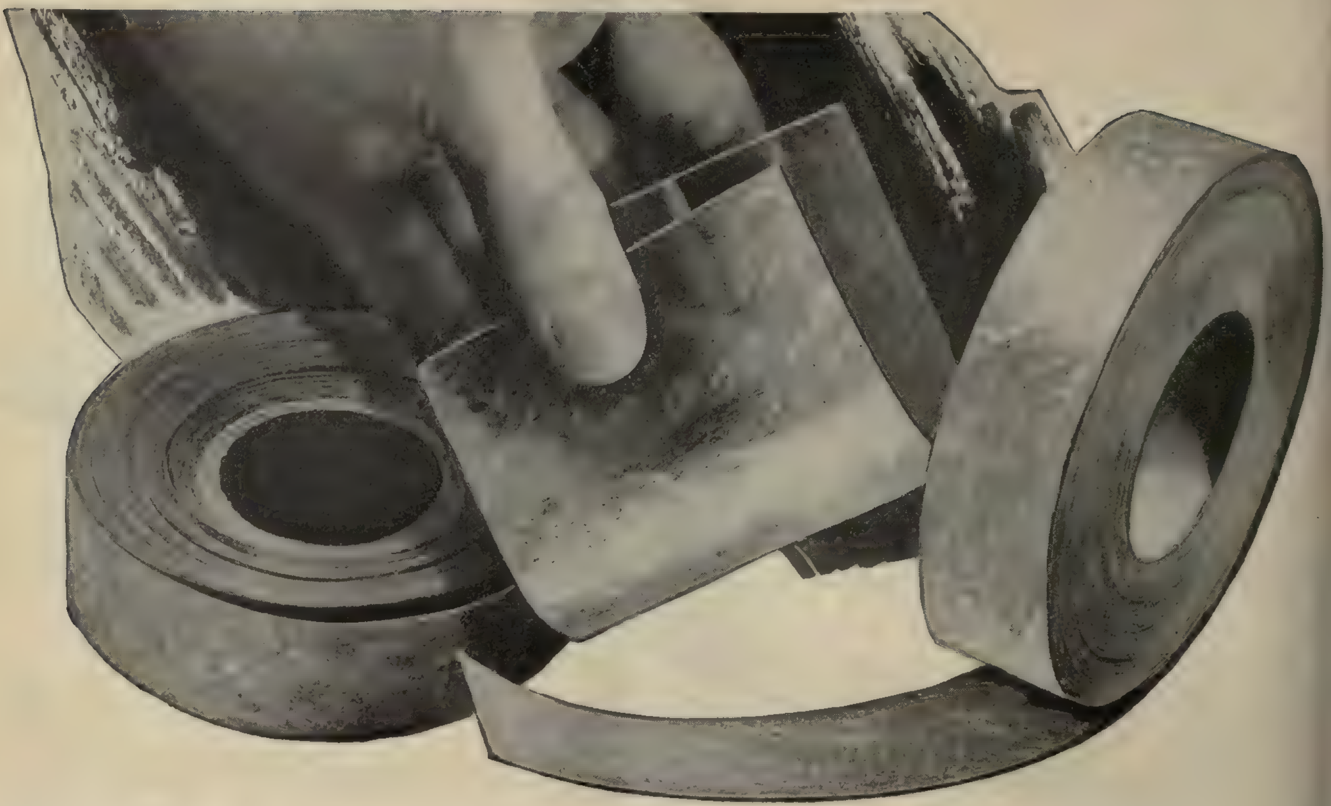
The SAFETY CAR . . .
CONTROL EQUIPMENT

Accelerates
Street Car Service

Waiting time of patrons is reduced by possible shorter headway between cars . . . time consumed in making stops decreased by quick brake application . . . standing time of cars reduced by rapid passenger interchange . . . and quick get away permitted by prompt release of the brakes.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH



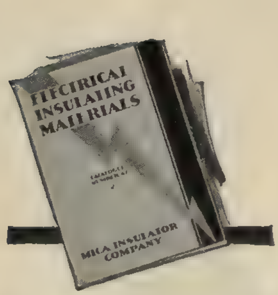


Mica in every form

for A.C. *motor insulation*

Protect A. C. motors and generator slot cells and coil phase sections with built-up mica! That's the way to assure lasting maintenance-free performance and the maximum of operating efficiency. Super-Micanite is practically indestructible under the heat and vibration of the severest motor and generator operation.

Flexible Super-Micanite in sheets or strips, Micanite Coil Insulation, Rope Paper and Mica, Micanite Paper, and Micanite Tape represent the built-up mica insulations ideal for A. C. machines. And the Mica Insulator Company offers in addition a complete line of Varnishes, Armco Paper, Varnished Cambric Tubing, in fact, a performance-proved electrical insulation for every need from slots to leads.



Complete information is given in Catalog 87. Write for a copy.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Works: Schenectady, N. Y. London, England
Cleveland Pittsburgh Cincinnati Birmingham Seattle
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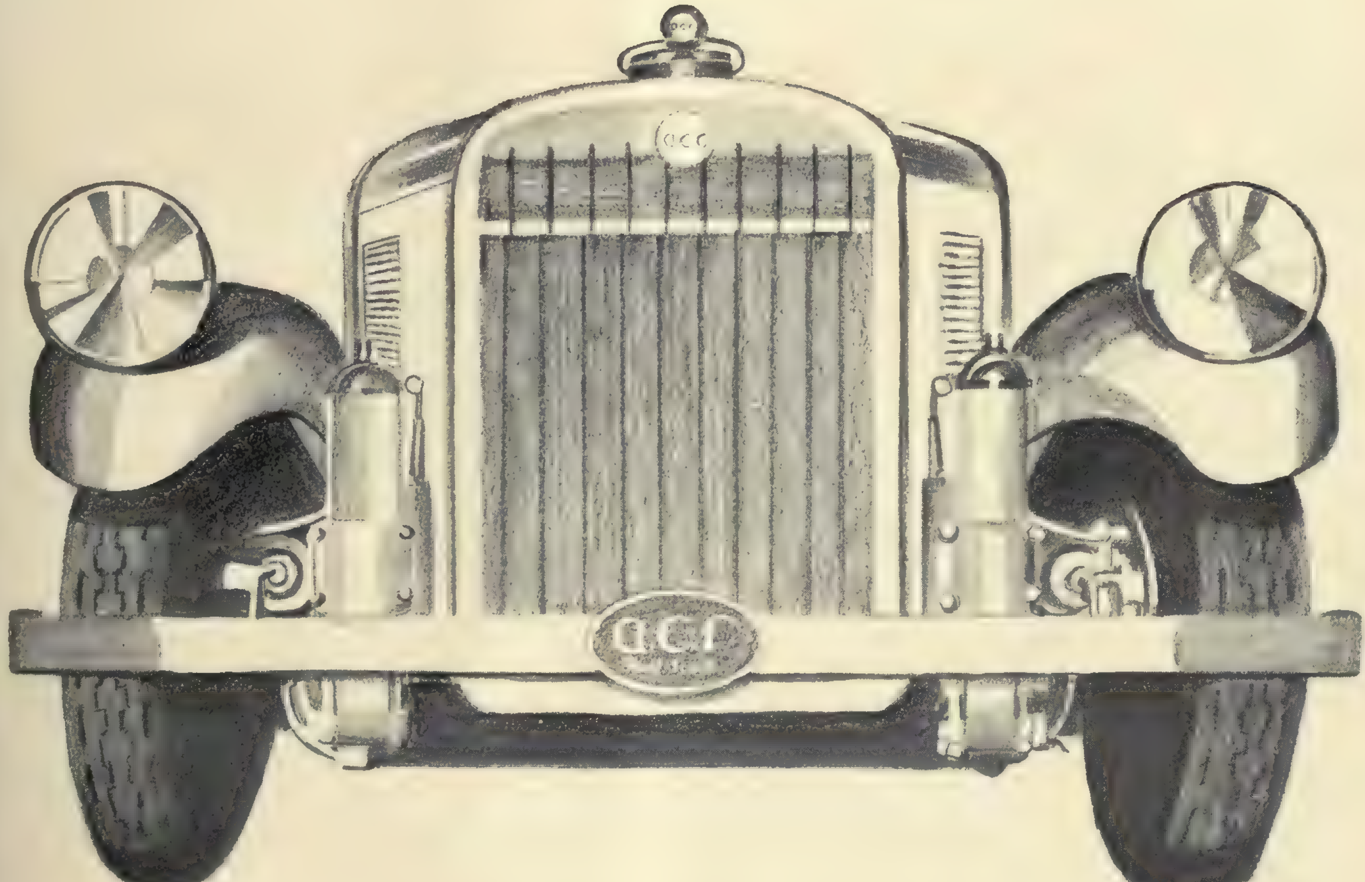
PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical
INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

12 more acf observation parlors to north coast lines because acf coaches have *proved* themselves in north coast's daily runs!



acf

There's a message for every operator interested in maximum coach efficiency in the records that a.c.f coaches have made for North Coast Lines in that company's runs from Portland to Vancouver.

These coaches, only 33 feet long, but with a 264″ wheel base, seat comfortably 38 passengers. They are powered with 175 horsepower Hall-Scott engines, turning at 1000 to 1400 r. p. m., the range of maximum torque and minimum fuel consumption . . . engines with reserve power to keep schedules right up to the minute without straining.

In twenty-three car months, these four coaches operated 240,389 miles, which figures 10,451 miles per month per coach, or a little more than 125,400 miles per year each. Gas mileage for these runs has averaged 4.49 miles per gallon, and oil mileage 92.03 miles per quart, both unequalled ratings for coaches of this size, power and performance.

Mechanical maintenance has been at an absolute minimum, and the engines have a long way to go before they will require any overhauling.

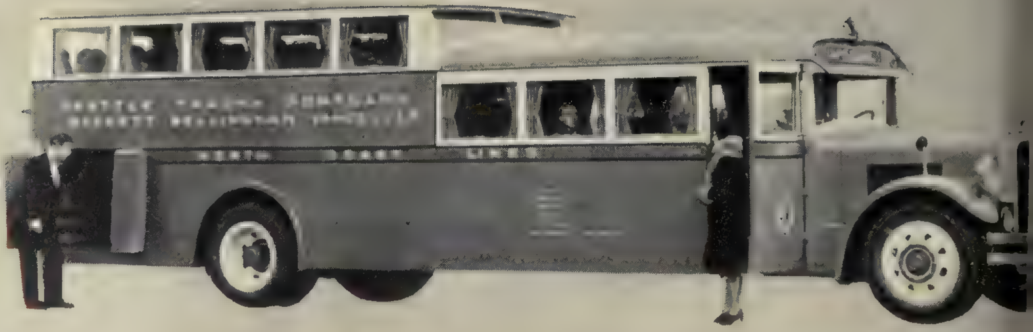
As a result of their excellent performance, North Coast Lines are taking delivery of five

ore large Observation Parlors im-
ediately . . . the choice being based
oon results proved by service. In
ldition to these coaches, North
oast Lines also operate two ACF
aches of similar type powered with
20 horsepower engines, which have
so proved so satisfactory that seven
ore of these smaller coaches are
ing delivered at the same time,
aking a total of 18 ACF coaches
this operation.

These patented ACF Obser-
tion Parlor Cars offer numerous

ACF

a.c.f.



exclusive advantages. Particularly important are the rider-appeal due to full visibility from eve seat; the clean-cut and convenient interior arrangement due to no wheel-housing interferen the entirely unobstructed view, and the perfect ventilation. From the operator's standpoint great advantage is the fact that the rear seats automatically tend to fill first.

Heavy baggage is handled and loaded at curb level, and is carried safely in a fully seal dust-proof and water-proof compartment. These a.c.f. Observation Parlor Cars have full he room throughout, and convenient inside parcel racks for the riders' convenience.

The method of heating is also new, but is backed by sound and sensible engineeri Clean, fresh air, heated by the engine radiator, is forced through air-tight ducts into the coa thereby both warming and ventilating. The large volume of incoming air forces out any objecti able stale air and makes for passenger comfort at all times.

This patented Observation Parlor Car, available only from a.c.f., has given distinguis service on motor coach operations from the Pacific to the Atlantic. Through its ability to incre the number of passengers carried, combined with the characteristically low operating expe associated with Hall-Scott powered a.c.f. coaches of all types, it meets most effectively requirement of both the Transportation and the Operating Departments.

AMERICAN CAR AND FOUNDRY MOTORS COMPANY, 30 Church St., New Y

SIGNALING WILL REDUCE OPERATING EXPENSES

USE UNION

ENGINEERED EQUIPMENT

Automatic Signals at Highway Crossings furnish better protection than crossing gates or watchmen. Signals are not subject to man failure and their positive indication is better observed and obeyed by motorists and pedestrians. They are economical in operation and usually cover investment costs in a short period.

"Union" Automatic Signals, too, are more and more generally recognized as the answer to the demands which are made upon schedules by present day competition. They permit reductions in running time, and promote more economical operation. And the promise of a quick, safe, passage is a business getter.

"Union" Centralized Traffic Control, when applied to electric traction roads will also create economies by reducing schedules and operating costs.

SIGNAL TO SAVE WITH "UNION" EQUIPMENT

1881 **Union Switch & Signal Co.** 1930

TRADE MARK

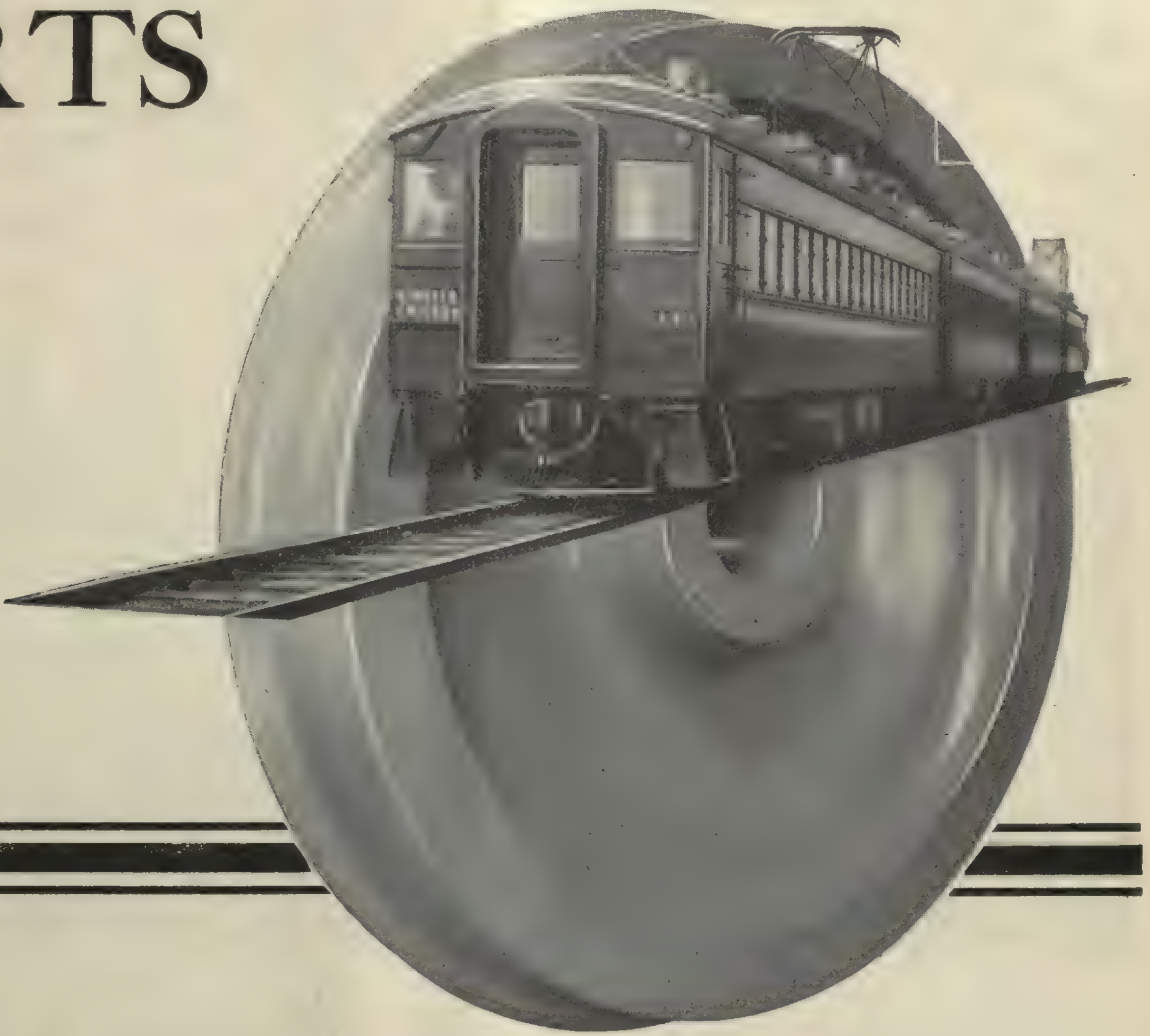
SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

"STANDARD" STEE

have the additional safety, strength and wearing qualities that reduce operating costs in modern high-speed electric railway service where fast starts and quick stops put heavy loads on vital parts.

ARTS



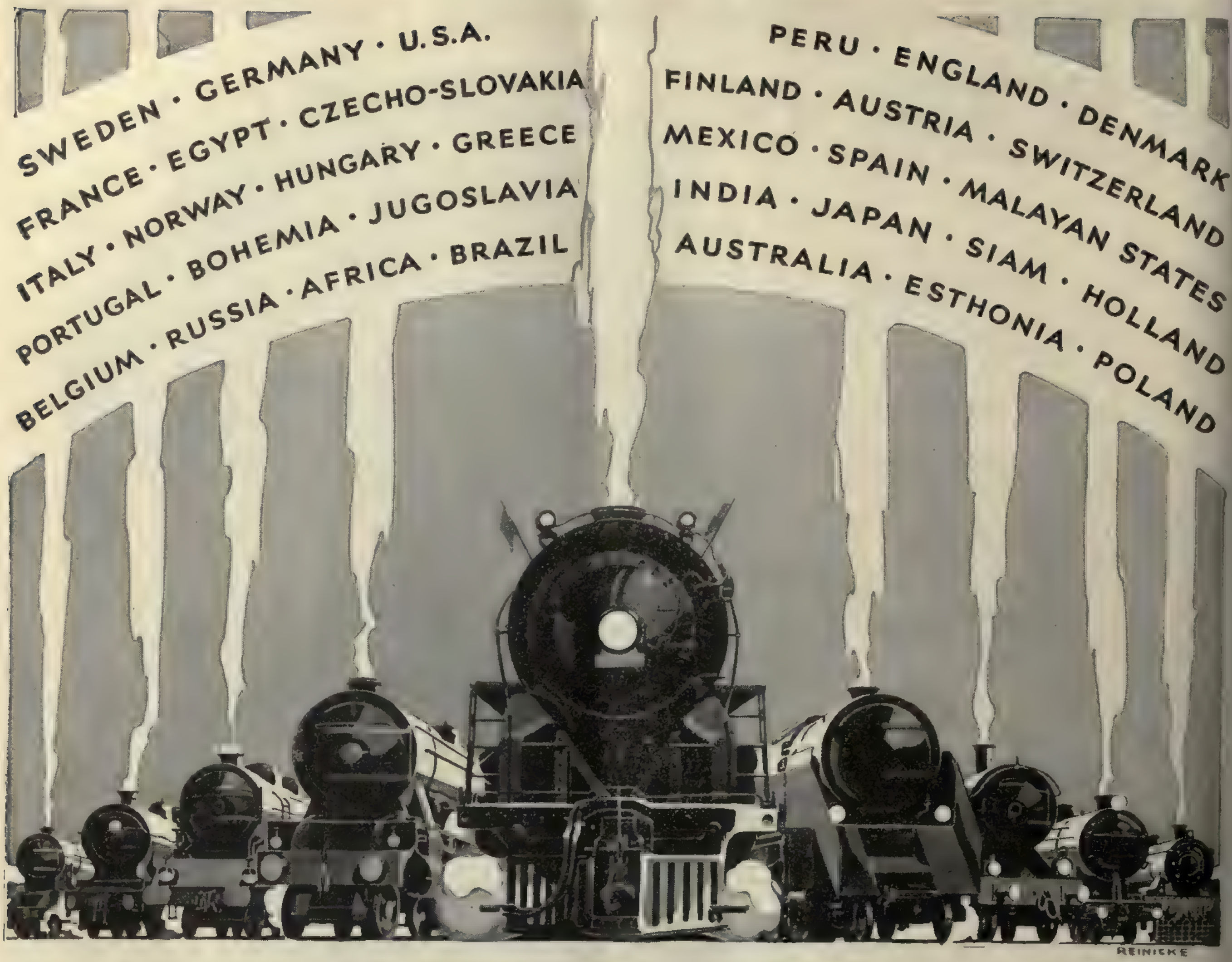
ALL the facilities of our organization—all our years of specialized experience—all the skill of our technical personnel work as a harmonious unit to achieve this end.

STANDARD STEEL WORKS COMPANY

General Offices and Works: Burnham, Penna.

Sales Offices:

New York
Chicago
Richmond
St. Louis
Philadelphia
San Francisco
Portland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REINICKE

On the railroads of the world

. . . including its four crack trains!

WHAT'S all this conversation on railway journal bearings about anyway? Why, **SKF** put its first Spherical Bearing into a railway journal so long ago that **SKF** had just about forgotten that this is supposed to be some sort of a super-bearing feat. Of course, it is a tough job for a bearing . . . that is if it stays on the job. But tackling that kind of an assignment is everyday business for **SKF**. Why, there are more **SKF** Bearings . . . many times more . . . in railroad service than all the other bearings of the world combined.

It was sixteen years ago that an **SKF** Bearing went into a journal box for the first time. Since then, that first bearing has been followed by 71,999 other bearings for locomotives, tenders, dining cars, baggage and passenger cars . . . in 33 countries throughout the world.

Get this significant fact when you judge bearing performance by railroad records . . . **SKF** Bearings are used on the four crack trains of the world—The Broadway Limited, The 20th Century Ltd., the Blue Train* of France and the Rheingold Express of Germany!

For, mark you this fact now. The railroads of the world find it far too expensive to buy a bearing on the basis of price . . . which means that the only thing left for consideration is performance . . . and that in turn means **SKF**—always. **SKF** Industries, Incorporated, 40 East 34th Street, New York, N. Y.

SKF

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* The Calais-Mediterranean Express

2502

"THE HIGHEST PRICED BEARING IN THE WORLD"

72 quick-service city cars . . .
42 heavy interurbans . . .
half-a-dozen loaded "freights"
—every twenty-four hours!

Looking south on Court Street, Elyria, Ohio. The track is protected with Carey Elastite System of Track Insulation, which forms a water-tight seal between the paving and the rail. Installation supervised by J. M. Powell, City Engineer.

THAT'S the heavy rail traffic over Court Street, Elyria, Ohio. Thousands of tons daily, yet the tracks are in perfect condition. No deterioration of the pavement—no displacement of the brick adjacent to the rail—even after four hard Winters. And not one dollar of upkeep expense! For the tracks and paving are protected with the Carey Elastite System of Track Insulation.

This pioneer Rail-Filler track improvement is used and recommended by engineers and officials in two hundred cities, large and small. Can be premolded to fit all types of rail. Investigate.

Carey Elastite
REG U.S. PAT OFF
TRADE MARK REGD. U.S. PATENT OFFICE
SYSTEM OF
TRACK INSULATION

Electric Railways Department
THE PHILIP CAREY COMPANY *Lockland,* CINCINNATI, OHIO

To ELECTRIC RAILWAY OFFICIALS:

The MERGOTT CARRIER

Combines Four Features of Outstanding Advantage to you . . .

PHILADELPHIA
PRT
CARFARE PRT CARRIER
SHOP BETWEEN 9 AND 3 AND SECURE A SEAT
SUFFICIENT SEATS, AT ALL HOURS, MUST AWAIT
THE COMPLETION OF CITY-BUILT SUBWAYS

Note the space on the reverse side—Suitable for your good will or an advertising message.

1. SAVES TIME. This compact, sturdy carrier enables your patrons to have the exact fare ready. No delays—no confusion—no bother.
2. INDUCES LARGE PURCHASES. People like to keep their token carriers filled. They buy several tokens at a time, instead of just enough for immediate needs.
3. PREVENTS MISTAKES. The Mergott Carfare Carrier does away with costly errors as change making is largely eliminated.
4. PRODUCES GOOD WILL. Traction Companies in 26 states and provinces have either given away or distributed the *Mergott Carfare Carrier* to riders at nominal cost. They find it an excellent builder of good will. Use the reverse side for advertising.

The valuable time saved—the mistakes eliminated—the new and better friends made, will more than repay you in a short while for the low cost of supplying your patrons with the Mergott Carfare Carrier.

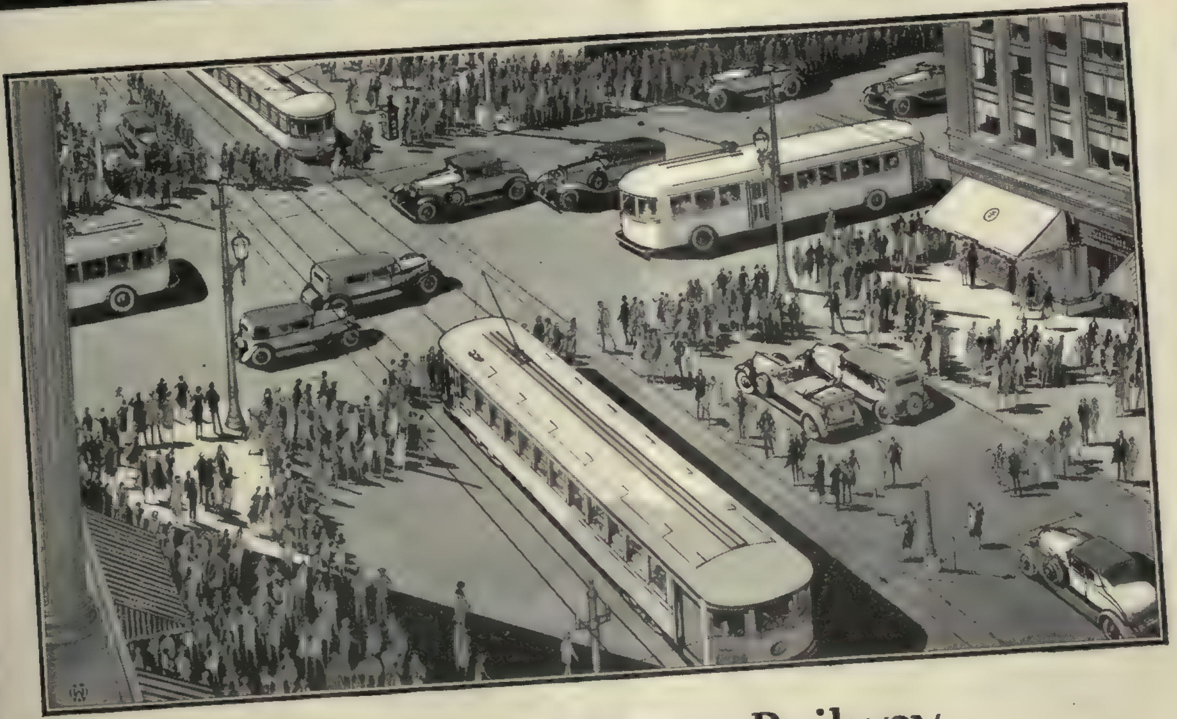
Let us send you a sample and full particulars. Write now!

The J. E. MERGOTT COMPANY

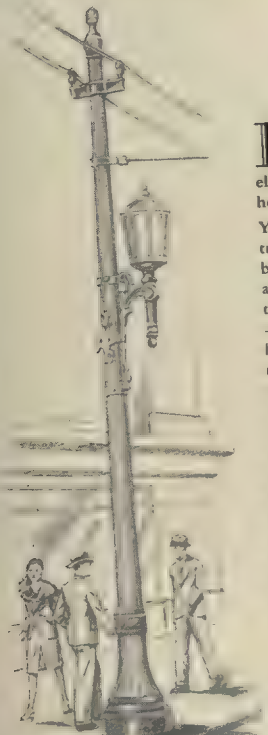
Manufacturers

316 to 368 Jelliff Ave. Newark, N. J.

UNION METAL SPEAKS TO THE PUBLIC ABOUT YOUR INDUSTRY



Your Street Railway is Building Your Community



IT IS more than a coincidence that the rapid development of our cities has come since the electric lines took over the duties of the leisurely horse-car.

Your street railway system has made a great contribution to the growth of your community. It has brought offices, factories, schools and stores within a few minutes of your home. It has built concentrated business areas—made possible the skyscraper—for by no other known means could forty millions of people be transported every day within the narrow confines of our city streets with the speed, comfort and convenience which traction lines provide.

Today America is dependent on its electric railways. In many cities 80 per cent of the workers rely on street cars for transportation. More than 75 per cent of the shoppers in the average large city use the street railways. And yet this great industry is supported by pennies, nickels and dimes. The average person who rides to work regularly on the street car spends approximately $54 a year for transportation—less than the garage rent for an automobile.

In return this industry contributes nearly three-quarters of a billion dollars in wages, rents and taxes to the communities it serves. Furthermore, each year, millions of dollars are spent in extending lines, improving equipment and in bettering service. Your street railway is still building your community.

Nor have electric railways been slow to sense the demand for improved street appearance. In over twenty of our largest cities, Union Metal Fluted Steel Poles have been adopted to support trolley span wires and feeder lines. In this type of pole are found the beauty of the ancient fluted column and the sturdiness, strength, and durability peculiar to steel. In many instances, all electrical services (street lighting, traffic signals, span wires, feeder lines—and at times telegraph wires and central station distribution lines) are combined on one set of poles, thereby clearing the curb-line, improving the street appearance and often effecting outstanding economies.

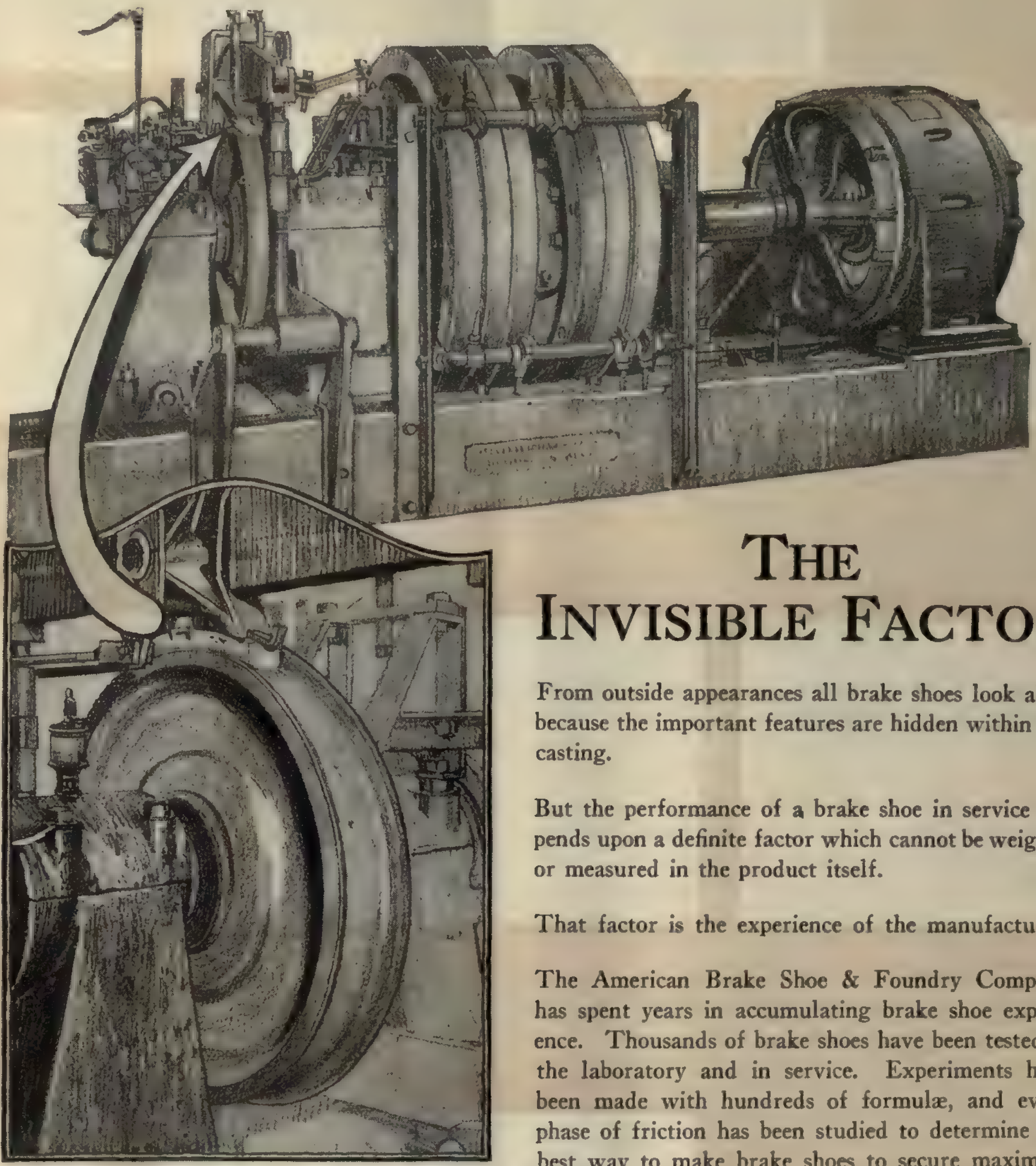
UNION METAL
FLUTED STEEL PRODUCTS

THE UNION METAL MANUFACTURING CO
General Offices and Factory Canton Ohio
Sales Offices New York, Chicago, Cleveland, Boston, San Francisco, Los Angeles, Seattle, Dallas, Atlanta

UNION METAL FLUTED STEEL Distribution Poles

Distributors
General Electric Merchandise Distributors
Graybar Electric Company, Inc.
Offices in all principal cities

SEE THIS ADVERTISEMENT IN THE SATURDAY EVENING POST, JUNE 21 ISSUE



Upon this brake shoe testing machine modern conditions of load and speed can be duplicated for laboratory test purposes. The information which has been accumulated by constant use of this equipment is reflected in the superior wearing quality of Diamond-S brake shoes.

THE INVISIBLE FACTOR

From outside appearances all brake shoes look alike because the important features are hidden within the casting.

But the performance of a brake shoe in service depends upon a definite factor which cannot be weighed or measured in the product itself.

That factor is the experience of the manufacturer.

The American Brake Shoe & Foundry Company has spent years in accumulating brake shoe experience. Thousands of brake shoes have been tested in the laboratory and in service. Experiments have been made with hundreds of formulæ, and every phase of friction has been studied to determine the best way to make brake shoes to secure maximum efficiency.

Diamond-S brake shoes are the most efficient brake shoes that have ever been made. They embody all of our many years of experience.

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

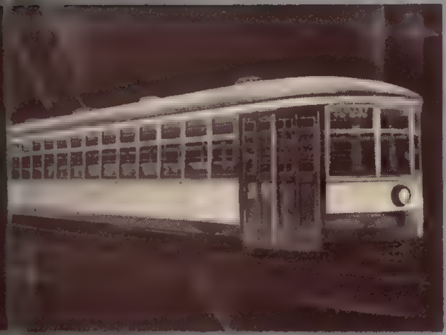
230 Park Ave., New York
332 So. Michigan Ave., Chicago

One of these days you'll be operating Aluminum Cars on your system

ilt … J. G. Brill Co., for Third Avenue
ilway System, N. Y. Aluminum used
body, under-frame and parts of the
ack. Total weight of car 27,000 lbs.

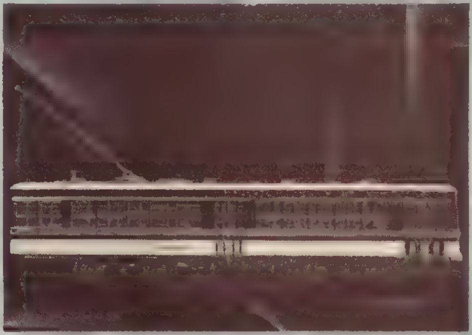
Built by Cincinnati Car Corp., for Louisville Railway Co. In service Sept. 1929. Aluminum used for body, under-frame and truck. Total weight of car 29,150 lbs. 2,300 lbs. of aluminum used. 2,500 lbs. dead-weight saved.

Built and operated by Cleveland Railway Co. In service Dec. 1926. Aluminum used on body, under-frame and trucks. Total weight of car 30,300 lbs. 6,647 lbs. of aluminum used. 12,901 lbs. dead-weight saved.

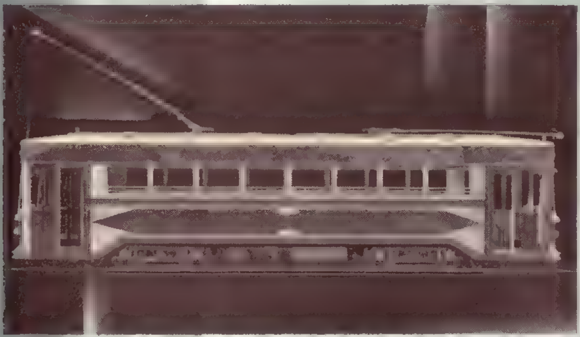


lt and operated by Twin City Rapid
ansit Co. In service Dec. 1927. Alu-
num used for sheets, posts and carlins.
al weight of car 27,670 lbs. 1,372 lbs.
aluminum used. 2,618 lbs. of dead-
ight saved.

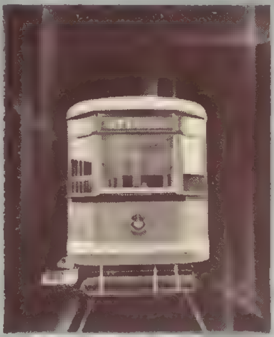
Built by Canadian Car and Foundry Co., for Montreal Tramways Ltd. In service 1927. Aluminum used for framing and exterior sheathing. Total weight of car 33,400 lbs. 2,275 lbs. of aluminum used. 3,700 lbs. of dead-weight saved.



Built by Osgood-Bradley Car Corp., for Pittsburgh Railways Co. In service June 1929. Aluminum used for body and under-frame, also for trucks, except axles, wheels and springs. Trucks built by Timken-Detroit Axle Co. Total weight of car 25,200 lbs. 3,325 lbs. aluminum used. 7,863 lbs. dead-weight saved.



Built by J. G. Brill Co. for Delaware Electric Power Company. Aluminum used for sheeting, seats and miscellaneous parts. 10 cars in service Dec. 1928. 10 additional cars in service 1929.



Built by Cummings Car & Coach Co., for Chicago & Joliet Electric Railway Co. In service Nov. 1927. Aluminum used for body and under-frame. Total weight of car 23,722 lbs. 10,000 lbs. of aluminum used. 13,500 lbs. dead-weight saved.

ALCOA

ALCOA ALUMINUM

Study the record of the use of Alcoa Aluminum in the Electric Railway Field

ALCOA

STATISTICAL RECORD ON THE USE OF ALUMINUM IN THE RAILROAD AND ELECTRIC RAILWAY FIELD.

OPERATOR	BUILDER	DATE BUILT	NO CARS	WEIGHT OF SUPERSTRUCTURE INCLUDING ACCESSORIES			WEIGHT OF UNDERFRAME			WEIGHT OF TRUCKS INCLUDING MOTORS			TOTAL WEIGHT OF CAR				WEIGHT PER SEATED PASSENGER			WEIGHT PER LINEAR FOOT			ALUMINUM APPLICATIONS
				(1) STEEL OR COMPOSITE STEEL CONSTRUCTION	WITH ALUMINUM APPLICATION	SAVED	(1) STEEL OR COMPOSITE STEEL CONSTRUCTION	WITH ALUMINUM APPLICATION	SAVED	(1) STEEL OR COMPOSITE STEEL CONSTRUCTION	WITH ALUMINUM APPLICATION	SAVED	(1) STEEL OR COMPOSITE STEEL CONSTRUCTION	WITH ALUMINUM APPLICATION	SAVED	PER CENT	(1) STEEL OR COMPOSITE STEEL CONSTRUCTION	WITH ALUMINUM APPLICATION	SAVED	(1) STEEL OR COMPOSITE STEEL CONSTRUCTION	WITH ALUMINUM APPLICATION	SAVED	
RAPID TRANSIT LINES:																							
BOARD OF TRANSPORTATION, NEW YORK CITY																							
PASSENGER CAR (*MOTOR*)	AMERICAN CAR and FOUNDRY CO	1930	300																				
ELECTRIC STREET AND INTERURBAN RAILWAYS:																							
CLEVELAND RAILWAY																							
CITY STREET CAR	CLEVELAND RAILWAY	1926	1	15,500	12,000	3,500	6,300	4,400	1,900	21,400	13,900	7,500	43,200	30,300	12,900	29 9	785	551	234	844	592	252	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS AND SIDE SILLS; TRUCKS COMPLETE EXCEPT WHEELS, AXLES AND SPRINGS.
SPRINGFIELD STREET RAILWAY, SPRINGFIELD, MASS.																							
CITY STREET CAR	WASON MANUFACTURING CO	1926	1										35,500	25 300	10,200	28 7	789	562	227	1,154	822	332	SIDE MEMBERS. LETTER BOARD; BELT RAIL; AND BODY BOLSTERS.
CHICAGO AND JOLIET ELECTRIC RAILWAY CO., JOLIET																							
CITY STREET CAR	CUMMINGS CAR AND COACH CO	1927	1	16,800	7,800	9,000	7,100	2,600	4,500	13,300	ANU	–	37,200	23,700	13,500	36 3	744	474	270	894	576	318	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS
ST. LOUIS PUBLIC SERVICE CO.																							
CITY STREET CAR	ST LOUIS PUBLIC SERVICE CO	1927	1	17,950	15,100	2,850	6,950	4,450	2,500	12,450	ANU	–	37,350	32,000	5,350	14.3	633	543	90	737	632	105	" " " " " " "
MONTREAL TRAMWAYS, LTD.																							
CITY STREET CAR	CANADIAN CAR AND FOUNDRY CO. LTD	1927	10	21 100	17,400	3,700	WEIGHT INCLUDED IN SUPERSTRUCTURE			16 000	ANU	–	37,100	33,400	3,700	10 0	843	759	84	804	723	81	" " " " " " "
" " "	" " " " " "	1927	40	21,100	19,900	1,200	"	"	"	16,000	ANU	–	37,100	35,900	1,200	3 2	843	817	26	804	778	26	ALL SHEET IN SUPERSTRUCTURE
TWIN CITY RAPID TRANSIT CO., MINNEAPOLIS																							
CITY STREET CAR	TRANSIT SUPPLY CO.	1927	25	17,500	14,900	2,600	"	"	"	12,800	ANU	–	30,300	27,700	2,600	8.6	606	554	52	666	609	57	ALL METAL IN SUPERSTRUCTURE, SUPERSTRUCTURE PRINCIPALLY OF WOOD.
MONTREAL TRAMWAYS, LTD.																							
CITY STREET CAR	CANADIAN CAR AND FOUNDRY CO. LTD	1928	30	21,100	19,900	1,200	"	"	"	16,000	ANU	–	37,100	35,900	1,200	3 2	843	817	26	804	778	26	ALL SHEET IN SUPERSTRUCTURE
BRILL CO., THE J G (*DEMONSTRATOR*)																							
CITY STREET CAR	BRILL CO. THE J. G.	1929	1	14,850	10,400	4,450	"	"	"	13,600	ANU	–	28,450	24,000	4,450	15 6	677	571	106	854	720	134	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS.
DELAWARE ELECTRIC POWER CO., WILMINGTON, DEL.																							
CITY STREET CAR	BRILL CO., THE J. G.	1929	15	22,550	19,550	3,000	"	"	"	15,700	ANU	–	38,250	35,250	3,000	7 8	911	833	78	884	815	69	SHEETING; SEATS; AND MISCELLANEOUS PARTS
DEPARTMENT OF STREET RAILWAYS, DETROIT																							
CITY STREET CAR	THOMAS CAR CO., PERLEY A	1929	100																				
LOUISVILLE RAILWAY																							
CITY STREET CAR	CINCINNATI CAR CORP	1929	1	23,450	20,950	2,500	"	"	"	8,200	ANU	–	31,650	29,150	2,500	7.9	659	607	52	769	708	61	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS AND BODY BOLSTERS.
PITTSBURGH RAILWAYS																							
CITY STREET CAR	OSGOOD-BRADLEY CAR CO.	1929	1	23,200	14,000	9,200	"	"	"	13,100	11,250	1850	36 300	25,250	11,050	30 4	864	601	263	804	558	246	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS; TRUCKS COMPLETE EXCEPT WHEELS, AXLES AND SPRINGS.
ST LOUIS PUBLIC SERVICE CO.																							
CITY STREET CAR	ST LOUIS PUBLIC SERVICE CO	1929	1	17,950	15,100	2,850	6,950	4,300	2,650	16,800	ANU	–	41,700	36,200	5,500	13 2	673	584	89	823	714	109	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS
THIRD AVENUE RAILWAY NEW YORK CITY																							
CITY STREET CAR	BRILL CO., THE J G.	1929	1																				
UNITED TRACTION CO., ALBANY, N.Y.																							
CITY STREET CAR	CINCINNATI CAR CORP.	1929	1	27,200	24,700	2,500	WEIGHT INCLUDED IN SUPERSTRUCTURE			7,700	ANU	–	34,900	32,400	2,500	7 2	831	771	60	818	759	59	ENTIRE SUPERSTRUCTURE AND UNDERFRAME EXCEPT WOOD APPLICATIONS AND BODY BOLSTERS
BROOKLYN AND QUEENS TRANSIT CORP., BROOKLYN																							
CITY STREET CAR	BRILL CO., THE J G.	1930	100																				
ELECTRIC COACHES (TRACKLESS TROLLEYS):																							
UTAH LIGHT AND TRACTION CO., SALT LAKE CITY																							
CITY COACH	CINCINNATI CAR CORP	1928	25																				
BRILL CO., THE J G (*DEMONSTRATOR*)																							
CITY COACH	AMERICAN CAR CO.	1929	1							BUS TYPE CHASSIS			16,350	14,500	1,850	11,3	545	483	62	584	518	66	ENTIRE SUPERSTRUCTURE EXCEPT WOOD APPLICATIONS; SEATS; FLOOR FRAMING; AND FLOOR REINFORCEMENTS.

NOTES: 1. IN THE MAJORITY OF CASES NO SIMILAR EQUIPMENT EXISTS IN STEEL OR COMPOSITE STEEL CONSTRUCTION FOR THIS REASON WEIGHTS ARE ESTIMATED FOR STEEL OR COMPOSITE STEEL EQUIPMENT **ANU**- ALUMINUM NOT USED.

ALCOA ALUMINUM

THE modern street car must compete with motor traffic that gets away like a herd of scared deer and stops on a dime. Schedules must be faster—safety must be maintained—all unnecessary dead-weight must go.

The light, strong Alloys of Alcoa Aluminum have come to reduce the excess dead-weight of street cars. Having the same structural strength, but only 1/3 the weight, of iron or steel, these Alloys used in street car construction bring quicker acceleration and deceleration, higher top-speeds, greater riding comfort.

Our representative will be glad to consult with you. **ALUMINUM COMPANY** *of* **AMERICA**; 2463 Oliver Building, **PITTSBURGH,**

GARY

WROUGHT STEEL WHEELS

. . . . are manufactured to meet the requirements of A. R. A. and A. E. R. A. standard wrought steel wheel specifications.

Wheels are given rigid inspections at each step in the process of manufacture, insuring to the railroads a wheel that gives *safety, dependability* and *economy.*

Our Wheel Engineers are at your Service.

Illinois Steel Company
Subsidiary of United States Steel Corporation
General Offices:
208 South La Salle Street
Chicago

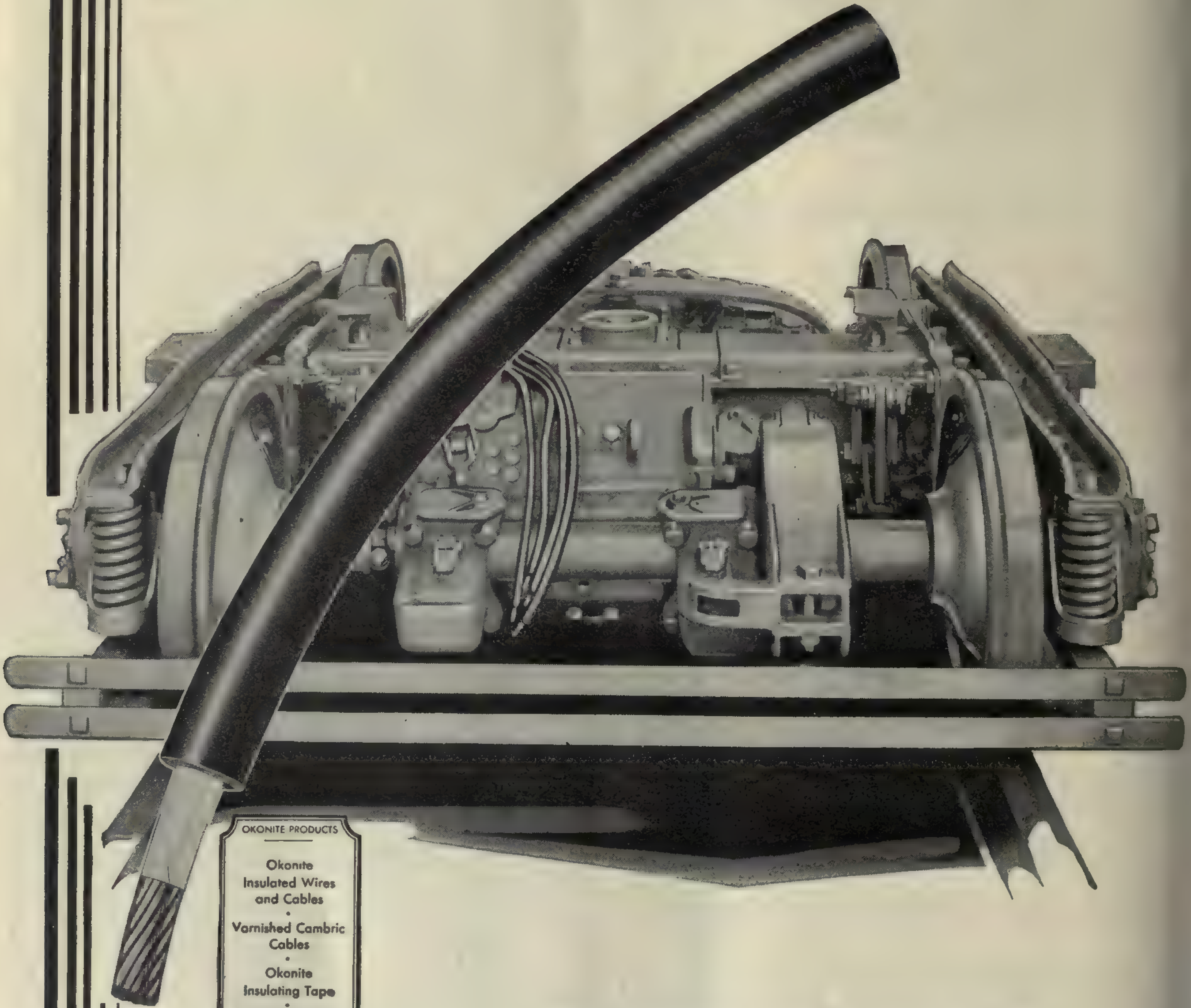
ALL THAT GOOD WHEELS SHOULD BE

Have You Tried OKOCORD Motor Leads?

OKOCORD motor leads are flexible cables covered with a rubber sheath that has all the qualities of an automobile tire tread. It stands tremendous abuse such as pulls, yanks, twists, bends, jams, water, oil, acid, alkali and severe abrasion.

Electric railway companies are using Okocord, not only for motor leads but for jumpers. In such service it has made remarkable records for durability.

Why not try it out on your own properties? It is easy to use and stands the gaff.



OKONITE PRODUCTS

- Okonite Insulated Wires and Cables
- Varnished Cambric Cables
- Okonite Insulating Tape
- Manson & Dundee Friction Tapes
- Okocord
- Okoloom

OKONITE-CALLENDER PRODUCTS

- Impregnated Paper Cables
- Super-tension Cables
- Splicing Materials

THE OKONITE COMPANY
Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.
Factories: Passaic, N. J. Paterson, N. J.

SALES OFFICES:
NEW YORK CHICAGO PITTSBURGH ST. LOUIS BOSTON ATLANTA
BIRMINGHAM SAN FRANCISCO LOS ANGELES SEATTLE DALLAS

Novelty Electric Co., Philadelphia, Pa.
F. D. Lawrence Electric Co., Cincinnati, O.

Canadian Representatives:
Engineering Materials, Limited, Montreal

Cuban Representatives:
Victor G. Mendoza Co., Havana

Sullivan 220-ft. Compressor and Sullivan Busters removed 300 ft. of 10-in. Concrete, in 10 Hours.

For Speed on track work

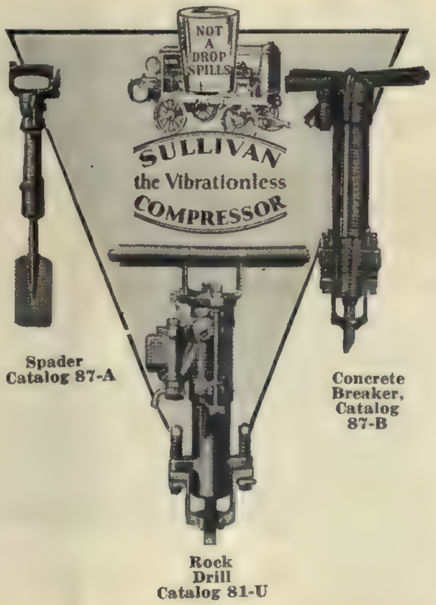
Sullivan air power equipment offers he means of speeding rock drilling, oncrete breaking, clay spading, and ther compressed air tasks.

Dependable Air Power

Sullivan Vibrationless Compressors ave made constant day and night uns as long as 5700 hours. They tay on the job, save waiting time for nen, and interest charges on all equipnent. Sizes: electric, 120, 175, 240, 350 feet; gasoline, 66, 110, 220, 310 eet; steel wheels, trailers, or skids.

Rock Drills Exactly Suited

ullivan Rock Drills, in solid and ollow piston types, air tube, water ube, auger, and extra light drills, nedium and heavy sinkers, and numerus other models are available.



Concrete Breakers and Clay Spaders

Two concrete breakers are available, with pick points, chisels, tampers, asphalt cutters, or sheet pile driving tools. Clay Spaders have long or short shanks, for open trenches or tunnels.

Portable Hoists

Sullivan Portable Hoists will save you time and money in pole setting, rail handling and on many other jobs around your barns, shops, or garages. The 345-lb. single-drum Turbinair Hoist will lift a ton on single line, or pull a 50-ton car. Electric hoists also available in single and two-drum models to 75 hp. *Send for Catalogs.*

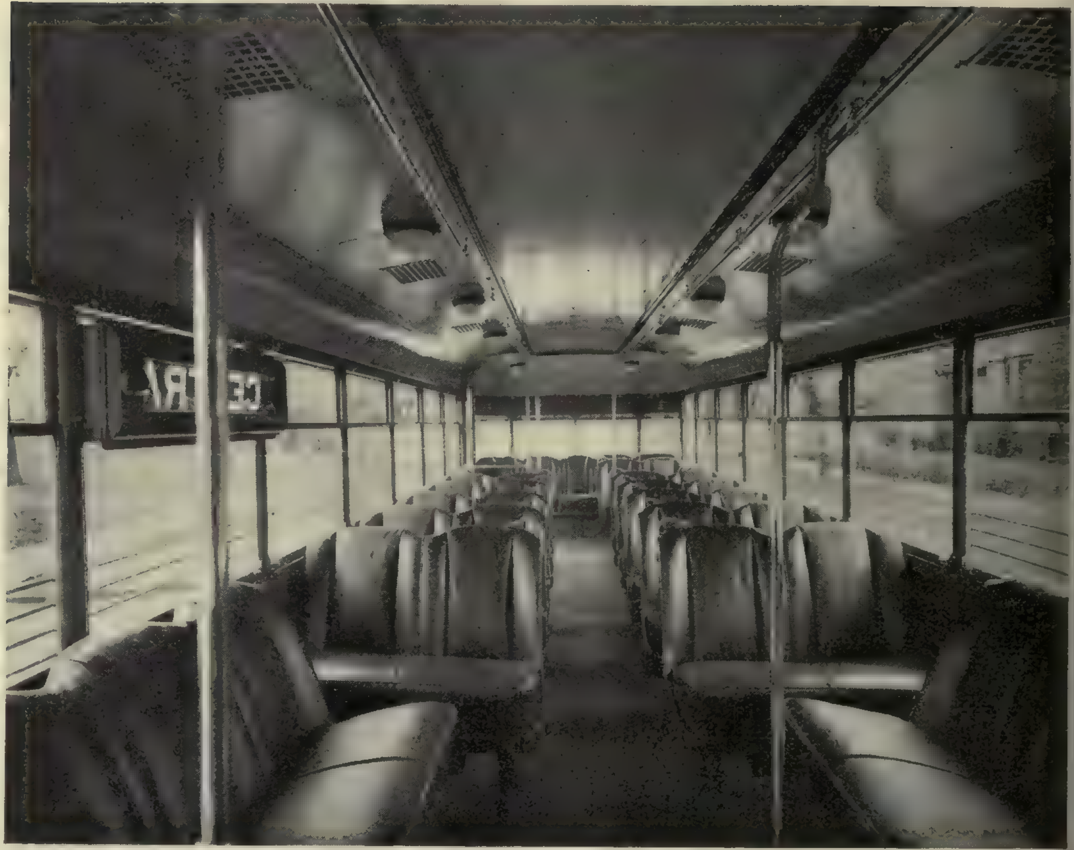
Send for the picture book "Speed Up With Air."

SULLIVAN AIR POWER EQUIPMENT

Sullivan Machinery Company

809 Wrigley Bldg.
CHICAGO

30 Church St.
NEW YORK



Relaxation is invited by these Art Rattan Seats installed in the New Twin Coach Trolley Buses for the Chicago Surface Lines.

On The Chicago Surface Lines

Passenger Comfort is Assured......

PART of the equipment for the feeder expansion program of the Chicago Surface Lines consists of 29 Twin Coach Trolley Buses.

The last word in modern design, every effort has been made, by means of appearance and comfort, to create patron appeal.

It is significant that in each of these Trolley Buses the seats are by Art Rattan.

Scientifically designed and constructed to invite and permit relaxation, we are convinced these Art Rattan Seats are the most comfortable ever built. Passenger comfort is assured.

ART RATTAN WORKS, INC.

Builders of DeLuxe Bus Seats

CLEVELAND • • • • • • • • OHIO

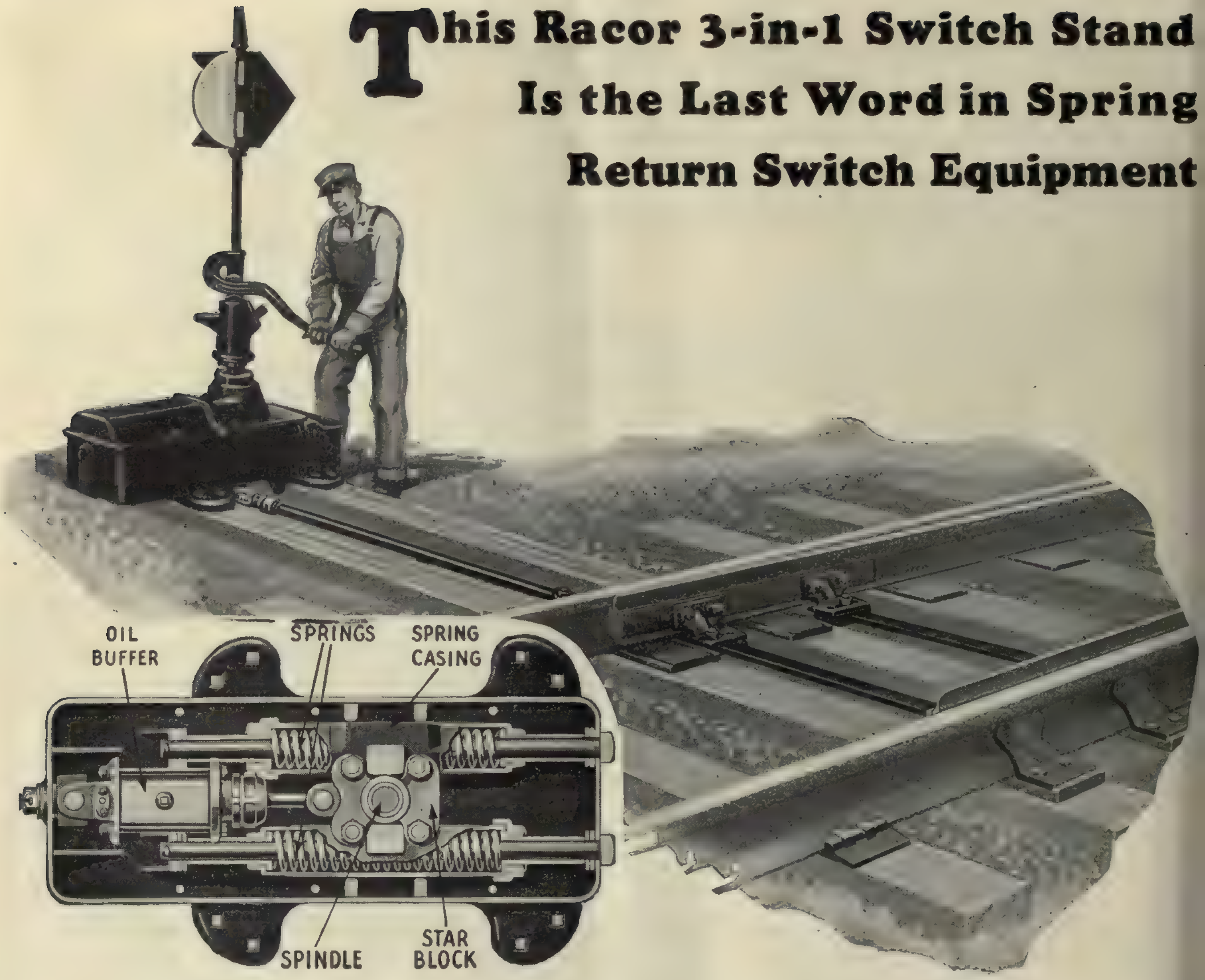
Carnegie Wrought Steel Wheels fulfill every requirement of the perfect wheel for electric railway service. They are safe—as only *rolled* steel wheels can be. 10,000 ton hydraulic presses impart to the steel a tough, dense structure, free from irregularities that might cause failure. They are durable—rendering long and continuous service. In addition to forging, they are thoroughly rolled, further refining the wearing surface. Mileage is forged in and rolled in—extra mileage that makes Carnegie Wheels the outstanding value in the wheel market today.

In city service these wheels have an added advantage in that cars may be speeded up with safety over special track work at crossings—an important factor in rush hours.

Carnegie Wrought Steel Wheels have satisfactorily answered the wheel questions of many prominent electric railways. Let them answer yours. Your inquiry will receive prompt attention.

CARNEGIE STEEL COMPANY
Subsidiary of United States Steel Corporation
PITTSBURGH, PA.
70

This Racor 3-in-1 Switch Stand Is the Last Word in Spring Return Switch Equipment



THE illustrations clearly show the construction of this newest Racor development. In one, self-contained, enclosed and protected unit it combines every desirable feature of

(1) An independent, rigid switch stand for hand operation

(2) A spring head rod for automatic return of points

(3) An oil buffer to retard the return of points and prevent slamming.

The stand is easy to install and when operated by hand is as easily thrown as any rigid stand. The target always follows the points.

The spring-return feature, contained within the base, permits points to be trailed through without injury and returns them to their set position when the last pair of wheels has passed. Always the target indicates the true position of the switch points.

This spring return feature is controlled by the oil buffer or dash pot. Acting somewhat like a door check, this dash pot permits the points to move over freely when trailed through, retarding their return until the last pair of wheels has passed. Then the points are returned, as slowly as may be desired, until nearly home, when they close rapidly into their original position.

The Racor 3-in-1 Switch Stand (Style No. 100-A) is a big factor in reducing operating costs. It maintains an uninterrupted schedule of train movements, safeguards equipment and promotes economies in lower installation and maintenance costs.

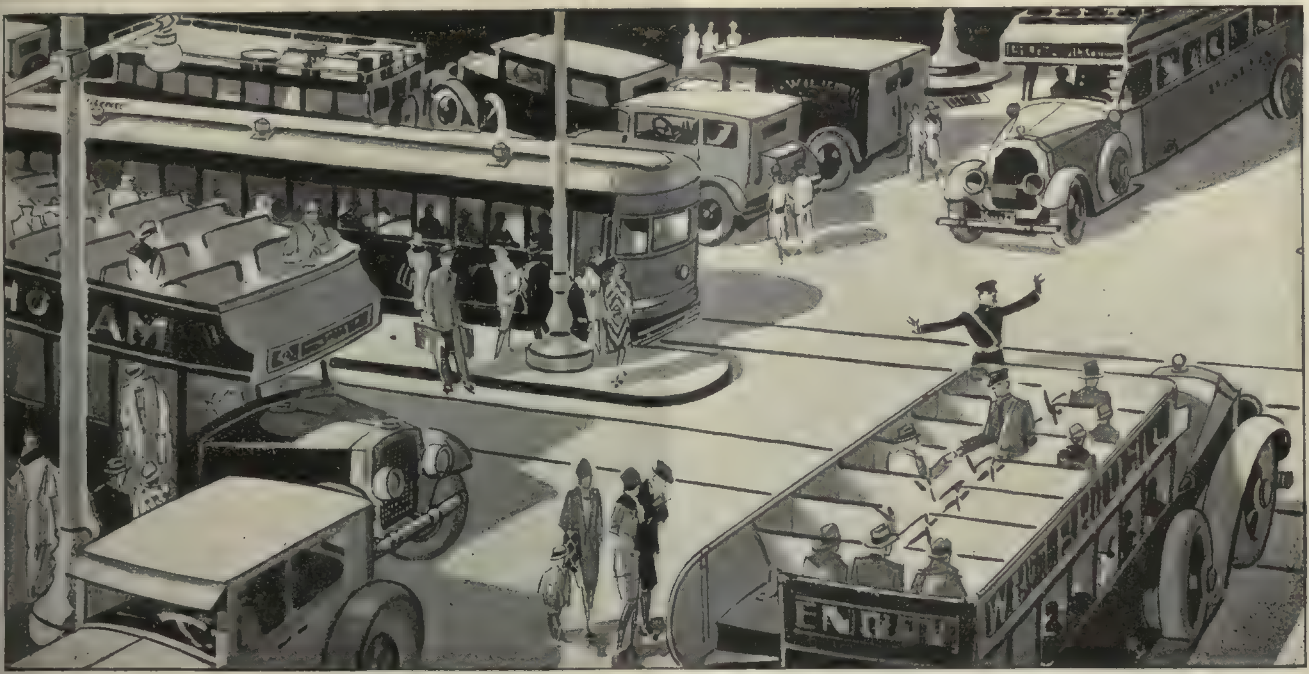
Behind Racor Service stand nine plants specializing in the manufacture and distribution of railroad track turnout and crossing equipment, including Manganese Work for heavy traffic.

RAMAPO AJAX CORPORATION

RACOR PACIFIC FROG AND SWITCH COMPANY, Los Angeles · Seattle
CANADIAN RAMAPO IRON WORKS, Limited, Niagara Falls, Ontario

General Offices — 230 PARK AVENUE, NEW YORK
SALES OFFICES AT WORKS, AND
MCCORMICK BUILDING, CHICAGO
METROPOLITAN BANK BLDG. WASHINGTON
BUILDERS EXCHANGE BLDG. ST. PAUL

Nine Racor Works
Hillburn, New York. Niagara Falls, N.Y. Chicago, Illinois. East St. Louis, Ill.
Superior, Wis. Pueblo, Col. Los Angeles, Cal. Seattle, Wash. Niagara Falls, Ont.



ROEBLING

Electrical Wires & Cables

Uninterrupted and economical transportation service depends upon continuous and efficient operation. These results are assured through the use of Roebling Electrical Wire Products of proven quality, among which are—

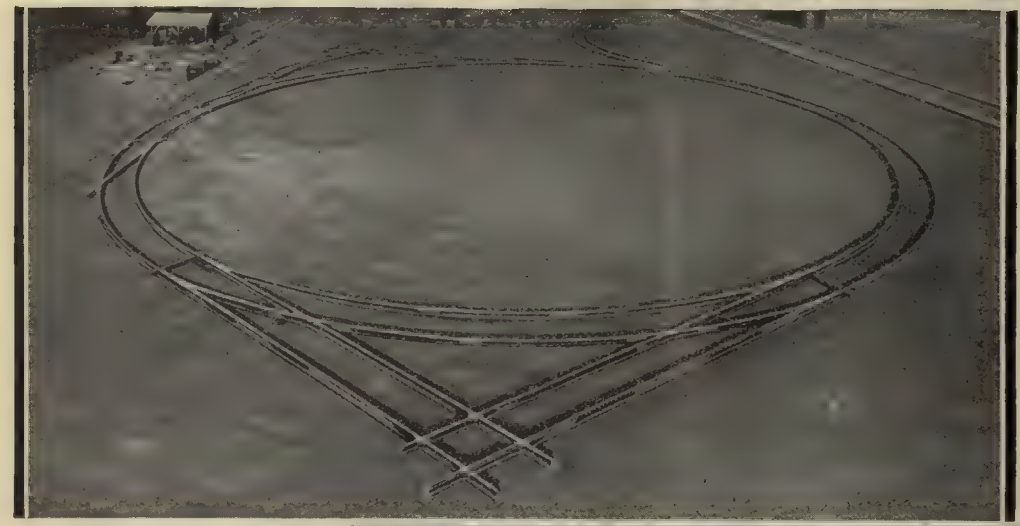
- Rubber Insulated Wires and Cables
- Paper Insulated Wires and Cables
- Railway Signal Wires and Cables
- Varnished Cambric Insulated Wires and Cables
- Magnet Wire—Silk or Cotton Insulated
- Armature and Enameled Field Coils
- Solenoids for Control Apparatus
- Automotive Wires and Cables
- Welding Cable, Trailing and Electrode Holder
- Welding Wire

John A. Roebling's Sons
Company
Trenton New Jersey

Makers of Wire Rope, Wire
and Electrical Wires
and Cables

Belgium follows the "beaten path" to

LORAIN



"If a man preach a better sermon, write a better book or build a better mouse-trap than his neighbor, tho he hide himself in the wilderness, the world will make a beaten path to his door."

Upper photograph shows the Liege Circle layout in the Johnstown yard of The Lorain Steel Company, prior to shipment to Leige, Belgium.

Lorain

GIRDER RAILS

GIRDER GUARD RAILS

PLAIN GIRDER RAILS

RAIL JOINTS AND TRACK ACCESSORIES

EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK

SPECIAL TRACKWORK

SWITCHES, FROGS AND CROSSINGS

in

Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail.

Lower photo—74-foot center radius circle being installed in Leige center square. All Tongue Switches, Frogs and Crossings are Cast Chrome Nickel Steel. All Rails heat-treated Girder Guard Section 102-438 with guard planed level with head. Tongue Switches are Tadpole type in pairs connected by means of rods enclosed in cast iron boxes with steel covers.

THE LORAIN STEEL COMPANY

JOHNSTOWN, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPAN
UNIVERSAL ATLAS CEMENT COMPANY

Pac. Coast Distributors—United States Steel Products Co. Columbia Dept., San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Co., New York Cit

LORAIN SALES OFFICES—Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh

BUS COMPANIES

that use Socony Special *plus* Ethyl and Socony Lubricants *cut down costs*

MANY bus companies throughout New York and New England are finding greater economy in using Socony lubricants and Socony Special Gasoline *plus* Ethyl.

For example, the buses and taxis of Holden's Motor Tours and Taxi Service at Melrose, Mass., are 100% Socony.

These coaches tour New York State, New Hampshire, and Connecticut on pleasure trips, and also make many trips for Boston employment agencies over rough going to the logging camps.

You can secure equally good results from the use of Socony products in your fleet. You will find not only that every lubricating and power-demanding emergency is met, but also that mileage is increased and repair bills are cut down.

SOCONY

Special Gasoline *plus* Ethyl

Motor Oil **Aircraft Oil**

STANDARD OIL COMPANY OF NEW YORK

2 GREATEST ELECTRIC RAILWAYS *in the world* select SOCONY

MORE than six million people a day use New York City's great subway, elevated and surface systems—the Interborough Rapid Transit and the Brooklyn-Manhattan Transit Company. It is imperative that schedules be maintained to handle this enormous traffic. The slightest delay is serious means an appreciable loss in revenue.

Socony lubricants have been chosen to lubricate the power plants and rolling stock of these two great systems, that operation may be smooth and schedules unbroken at all times.

We submit this endorsement of the dependability of Socony lubricants for your consideration in selecting lubricants for your operation.

SOCONY

INDUSTRIAL LUBRICANTS

STANDARD OIL COMPANY OF NEW YORK

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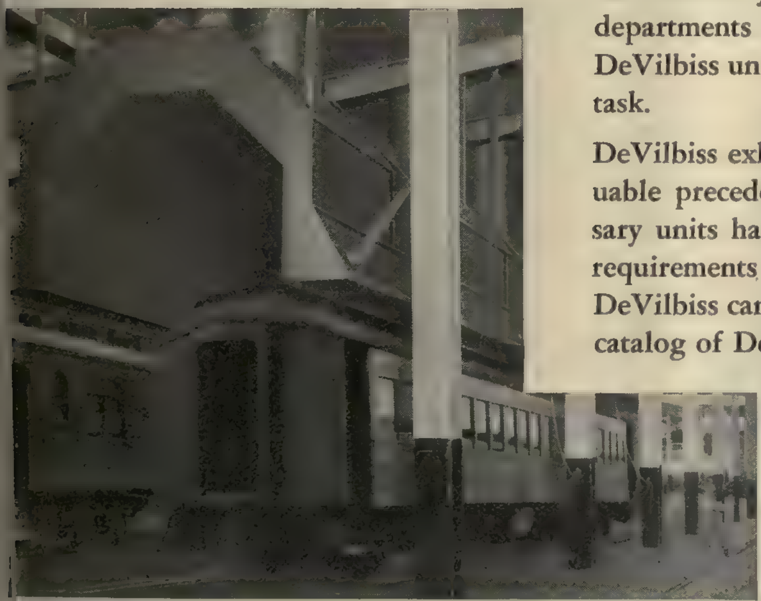
Engineered For This Particular Industry

DeVilbiss spray equipment brings an exclusive economy and efficiency into the finishing and finish maintenance departments of the electric railway operation because DeVilbiss units are designed and made for that particular task.

DeVilbiss exhausting installations have established a valuable precedent. DeVilbiss spray guns and other necessary units harmonize with the conditions, materials and requirements of transportation industry. Learn what DeVilbiss can do to save you time and money. Write for catalog of DeVilbiss specialized spray equipment.



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272 Phillips Ave.
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St. Louis San Francisco Los Angeles Windsor, Ont.
Direct factory representatives in all other territories.

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- Pressure feed paint tanks and containers
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from mine to consumer
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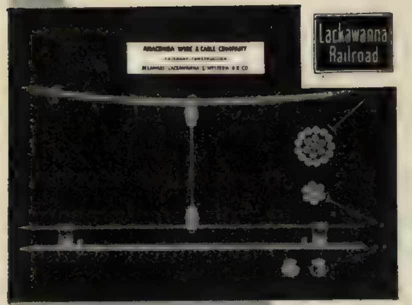
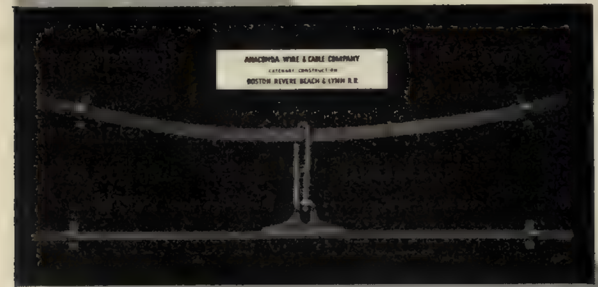
ANACONDA in Railway


ANACONDA WIRE & CABLE COMPANY
CATENARY CONSTRUCTION
DELAWARE LACKAWANNA & WESTERN R R CO
Lackawanna Railroad

Design of the catenary system used on D. L. & W. electrification. Main messenger cable of 7 strands calsun bronze and 13 strands H. D. copper; breaking strength, 32,000 lbs. Auxiliary messenger (4/0) 19 strand H. D. copper; breaking strength, 9,600 lbs. Contact wires (2 in parallel) Hitenso C; breaking strength (each), 12,150 lbs; conductivity 55% I. A. C. S.

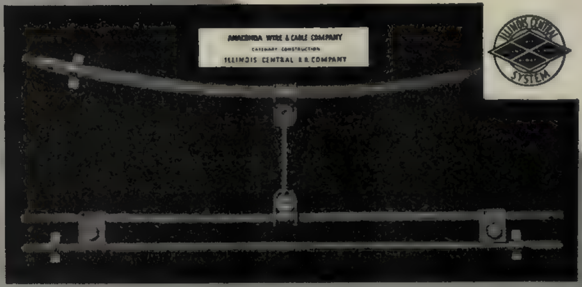
ANACONDA has contributed to the success of every outstanding railway electrification project in the United States. Anaconda engineers have cooperated in the design of the catenary systems, and Anaconda mills have fabricated upwards of 85% of the bronze, wire and cabl products required to meet the exacting an unalterable requirements.


ANACONDA WIRE & CABLE COMPANY
CATENARY CONSTRUCTION ON
BOSTON REVERE BEACH & LYNN R.R.

Design of catenary system, Boston, Revere Beach and Lynn Railroad. Main messenger of 37 strands H. D. copper; breaking strength, 22,510 lbs. Contact wire 4/0 grooved Hitenso A; breaking strength, 10,320 lbs; conductivity 80% I. A. C. S.

ANACONDA WIRE

General Offices
Chicago Office
Sales Offices i



Design of catenary system, Illinois Central Railroad. Main messenger of 7 strands Red Brass and 30 strands Hitenso BB; breaking strength, 31,280 lbs. Auxiliary messenger 19 strand H. D. copper; breaking strength, 9,000 lbs. Contact wires (2 in Parallel) 3/0 grooved Hitenso A; breaking strength (each) 8,410 lbs; conductivity 80% I. A. C. S.

Design of catenary construction used on Grea Northern electrification Main messenger of strand Red Brass and 1 H. D. copper; breakin strength, 23,800 lbs. Contact wire, 4/0 groove Hitenso A; breaki strength, 10,320 lbs; co ductivity 80% I. A. C. S.

ANACONDA
from mine to consumer
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LEADERSHIP
Electrification

naconda is equipped to supply every wire and
able need of the electric railway . . . trolley
vire, magnet wire, rubber-covered wire, flexible
ords, weather-proof wire, power cable, var-
ished cambric wire, armored cable . . . main
essenger cable, auxiliary messenger and special
ontact wire . . . engineering service, where
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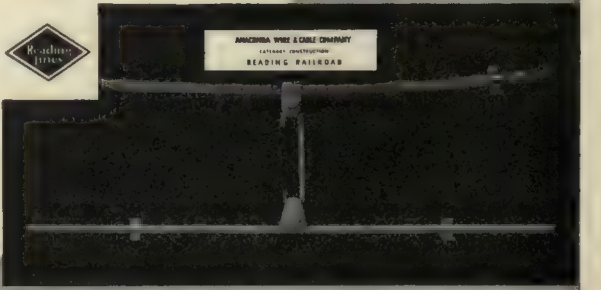
Anaconda safeguards quality from mine to consumer — provides a nationwide service, prompt, dependable and complete.



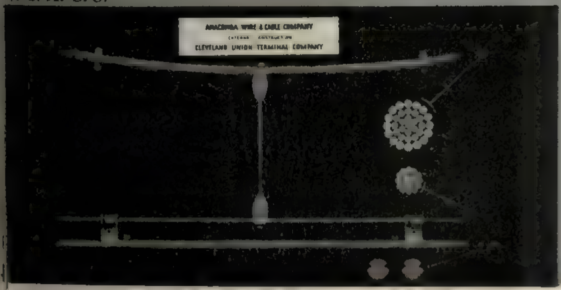
& CABLE COMPANY

5 Broadway, New York City
11 West Washington Street
rincipal Cities

Design of catenary system, Reading Railroad. Main messenger of 7 strands calsun bronze and 12 strands H. D. copper; breaking strength, 19,100 lbs. Contact wire 4/0 grooved Hitenso C; breaking strength, 12,150 lbs; conductivity 55% I. A. C. S.

ANACONDA WIRE & CABLE COMPANY
CATENARY CONSTRUCTION
THE PENNSYLVANIA RAILROAD COMPANY

atenary system, Cleve-
nd Union Terminal.
ain messenger of 19
rands calsun bronze and
strands H. D. copper;
eaking strength, 39,300
s. Auxiliary messenger
0 19 strand H.D. copper;
eaking strength, 9,600
s. Contact wires (2 in
rallel) 4/0 Hitenso C;
eaking strength (each),
,150 lbs; conductivity
% I. A. C. S.


ANACONDA WIRE & CABLE COMPANY
CATENARY CONSTRUCTION
CLEVELAND UNION TERMINAL COMPANY

Design of catenary system, Pennsylvania Railroad. Main messenger of 19 strands calsun bronze; breaking strength, 28,320 lbs. Auxiliary messenger, 4/0 grooved trolley wire; breaking strength, 7,740 lbs. Contact wire 4/0 grooved Hitenso C; breaking strength, 12,150 lbs; conductivity 55% I.A.C.S.

Announcing the 1930 McGraw Electric Railway Directory

CONTAINING DETAILED INFORMATION ON ELECTRIC RAILWAY COMPANIES . . . AND AFFILIATED BUS LINES . . . INCLUDING NAMES, TITLES AND ADDRESSES OF IMPORTANT OPERATING OFFICIALS

THE 1930 Edition of the Electric Railway Industry's standard reference authority is especially designed for those who need comprehensive information covering this field. It is an up-to-date, reliable guide to the active Electric Railway Companies in the United States and Canada.

The McGraw Electric Railway Directory contains vital data on all Electric Railways including Interurban and Street Railways, Subway and Elevated Roads, and the important Electrified Steam Roads.

Listed in this authoritative survey of the Industry are all the active Operating Companies; the Holding Companies, their Executives, Managing and Operating Personnel; Towns Reached; Rolling Stock; Track Mileage; Number of Cars; Shop Locations; Location and Generating Capacity of Power Plants; Capacity of Substations; Transmission and Trolley Voltages—and other pertinent information essential to all who have contact with or interest in the Electric Railway field.

Affiliated Bus Lines

Names and Addresses of the Bus Companies owned, operated or controlled by Electric Railway Companies —Companies that are soundly established and financed, ably managed and operated along broad aggressive lines. The 1930 McGraw Electric Railway Directory tells you who and where these Companies are—whether they are a subsidiary of big Railway Systems or operated as a separate department under Railway management. It gives you the Names and Titles of the men in charge of Bus Maintenance and Bus Operations, together with his address regardless of whether he is connected with the controlling Electric Railway Company or the subsidiary Bus Company.

Operating Data for Bus Companies include: Number of Buses in Operation; Miles of Route; Fares Charged; Number of Garages with Location and Capacity—just the data wanted and needed by manufacturers and distributors contacting these "A-1" prospects in the bus operating field.

All this information is so presented that it is readily available and easily selected.

Names and Titles of Important Personnel

As a roster of Electric Railway Executives and Operating Officials, the 1930 McGraw Electric Railway Directory serves you better than any previous edition.

By reference to the 1930 Directory you can instantly determine departmental responsibility—know name and title of the man in charge of each department and where you can reach him. In addition to listings of Chairman of Board, President, Assistant to President, Vice President, Secretary, Treasurer, Purchasing Agent and Master Mechanic, you have the name, title and address of the man in charge of such departments as: Railway Operations, Legal Department, Transportation Department, Track Department, Rolling Stock Department, Electrical Department, Claims Department, Accounting Department and Public Relations Department —together with their chief assistants.

In preparing this Edition all possible latitude has been allowed so that we could carry additional officials supplied by many companies who want total personnel reported. These men are shown under heading "Additional Officials."

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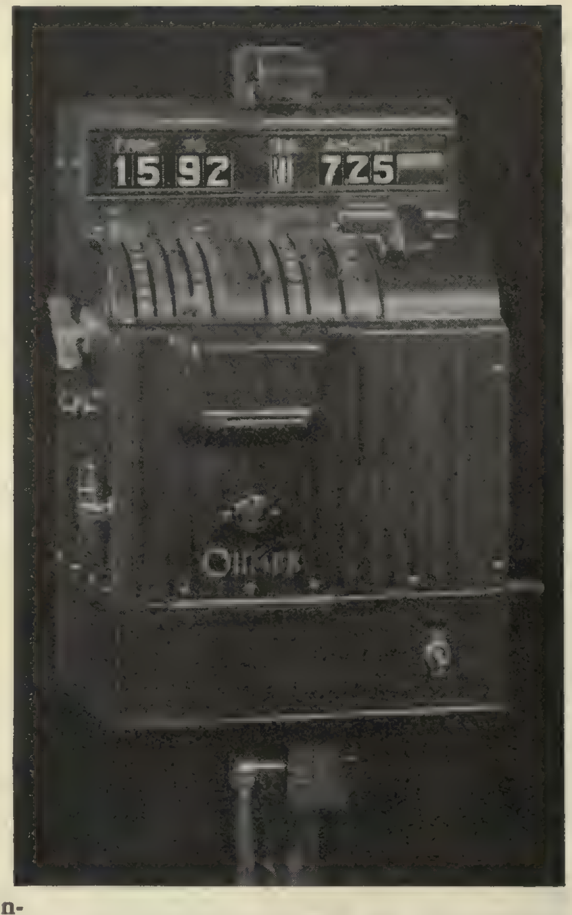
475 Tenth Avenue at 36th Street, New York, N. Y.

Special Ohmer displays *have been arranged at our West Coast Branches for* A. E. R. A. convention delegates



Here's the Ohmer Class 80 Ticket-Printing Register. Note the harmonious lines . . . the extra large visual indicator. Write today for full information about the Class 80 Register.

You are cordially invited to visit our Western Showrooms and inspect the latest Ohmer developments. You'll get new ideas about fare protection . . . transportation accounting . . . cutting operating costs . . . increasing profits.

Our Branch Managers will answer any questions you may care to ask and will try to make your visit pleasant and profitable. Feel free to call at any time.

OHMER ON THE PACIFIC COAST

In the West, as in the East, the Ohmer Fare Register Company has long been identified with the development and growth of electric transportation. Many of the largest western electric railway systems have used Ohmer Registers continuously for more than twenty-five years.

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The Key System Transit Co., Oakland, California, is now using 215 Ohmer Registers. The original contract, made in 1904, was recently renewed. When the term of this new contract is completed, this company will have used Ohmer Registers for *31 consecutive years.*

The Pacific Electric Railway Co., Los Angeles, is now using 1000 Ohmer Registers. Including the term of the contract, recently renewed, this company will have used Ohmer Registers *continuously for 28 years.*

The Southern Pacific Co., San Francisco, has 200 Ohmer Registers in use. The latest contract renewal will give it *24 years of continuous Ohmer service.*

The Northwestern Pacific Railroad Company, of San Francisco, using approximately 100 Ohmer Registers, recently extended its contract for a long term of years.

The Market Street Railway Company, of San Francisco, is also using Ohmer Registers under a long-term contract.

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Dayton, Ohio, U. S. A.

OHMER
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PORTLAND—148 NORTH 6TH STREET

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THEN WHY SCRAP WORN BALL BEARINGS?

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You sharpen the dull knife and it's as good as new. You exchange worn bearings for AHLBERG GROUND BEARINGS and get bearings that give as good service as new ones.

The exchange means an average saving to you of 40% on the cost of new bearings. That's a nice extra profit on your bearing replacement jobs—when you figure what it runs up to in the course of a year. Estimate the extra profit you can make on replacements for "fleet" owners alone—in addition to the work you do for single car and one-truck owners.

AHLBERG GROUND BEARINGS have been tested by actual SERVICE—the real test of quality—and are reconditioned by the experts who make C. J. B. Bearings. We carry a full line of all types and sizes, and guarantee satisfaction. Branch houses and authorized distributors located throughout the entire country can make exchanges at once. Mail orders delivered by nearest branch within 24 hours.

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In Absence of Convention Exhibits—

"C" Clamp Supporting Pole Corroded at Base

"B" Clamp Reinforcing Corroded Swaged Joint

"A" Clamp Installation

As we can not show our products themselves at San Francisco, we are mailing Sales Bulletin No. 3, Accessories for Tubular Iron Poles, together with reprint of this advertisement to Companies probably having tubular poles in service. If we have missed you, we hope you will write for this new literature suggesting methods and devices assisting in the economical solution of these problems:

Ground-Line Corrosion—Reinforcing Clamps, types for use without, or over, factory sleeves. *Illustrated.*

Upper Joint Corrosion—Reinforcing Clamps, types for swaged or unswaged joints. *Illustrated.*

Corrosion in Pole Steps, under Collars, etc.—Reinforcing Clamps, suitable also for tubular switch standards corroded under ladder supports.

Pole Top Extension—Reinforcing Clamps for extensions with pipe of same size, or one inch smaller. *Illustrated.*

Temporary Construction—Build up poles of any required length from poles on hand, lengths of pipe, and Reinforcing Clamps. All material salvaged following use.

Anchorage, Temporary or Permanent—Williams Pole Mounts will anchor poles on bridges, retaining walls, rock, etc. Other types for anchoring wood poles, or for salvaging wood poles rotted at ground-line and sound above ground. *Illustrated.*

Attaching Wood Crossarms to Tubular Pole—Crossarm Gains, secured with U-bolts or back straps, requiring no drilling of pole. Other types for wood poles using through-bolt. *Illustrated.*

Also send for samples and literature on latest types of devices helping to solve these problems:

Suspension of Signal Wires, Control Cables, etc.—Span Hangers with split porcelain insulators for grouping, or with spool insulators for spacing apart—for services with, or across, the supporting messengers.

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We feature Engineering Service for special jobs.

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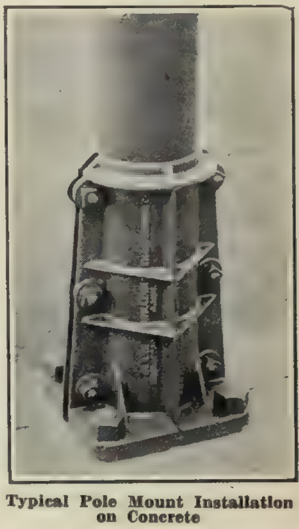
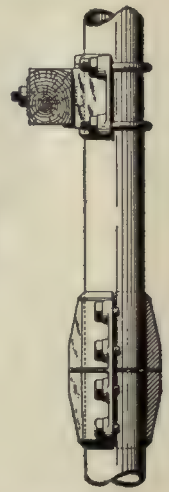

Typical Pole Mount Installation on Concrete


"C" Clamp Extension and Gain Assembly

"C" Clamp Supporting Pole Top Extension

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Recently some new additions have been made to our line of genuine leathers tanned especially for railway and bus seats.

The General Leather Company invites your consideration of these leathers for your new cars and buses. The requirements of the transportation industry have been our chief incentive for developing these upholstery products. These transportation leathers will wear indefinitely, clean easily with soap and water, and will always look attractive.

At the same time we are aware of the attractive interiors that are making modern cars and buses restful and comfortable, therefore we have developed these "General Leathers" in a variety of colors and grains. Colors which will stay fast and do not soil passengers' white clothing. Grains which make soft and pliable seats.

Specify "General Leather" for new Electric Cars, Buses and Taxi-cabs or order from us for replacements. On quantity orders we can cut directly from individual patterns to avoid waste.

Samples on request.

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MAHON

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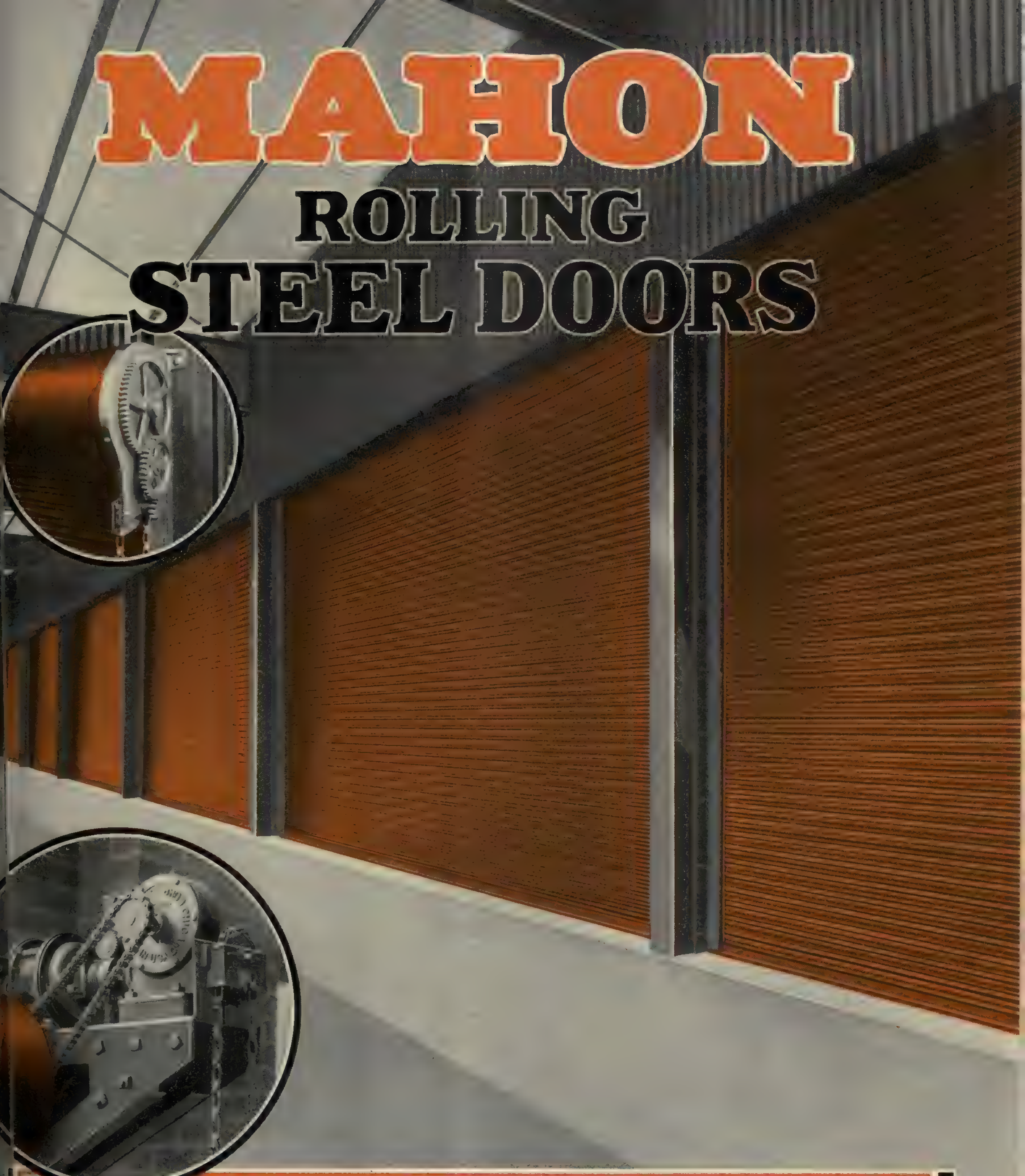
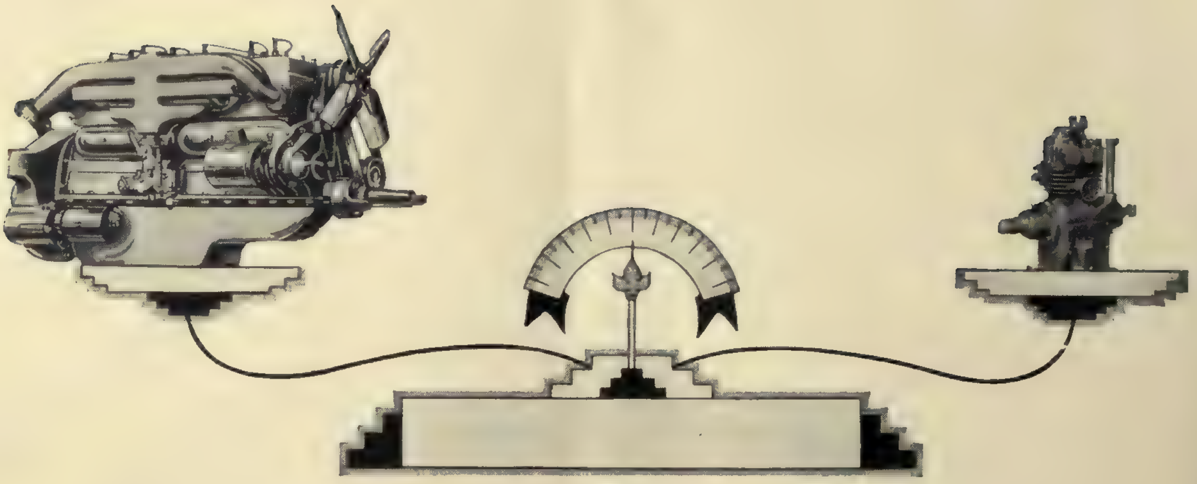


MAHON ROLLING STEEL DOORS are approved by the Underwriters' Laboratories Inc. . . . they embody the latest developments in doors of this type . . . they meet every requirement for openings in every type of industrial or commercial building. For dividing fire walls, for elevator shafts, and for exterior openings these improved doors offer the utmost in fire and burglar protection together with long life, dependable operation and fine appearance. Write today for estimates or detailed information.

THE R. C. MAHON COMPANY

DETROIT MICHIGAN



The balance of motor power

More and more the question of adequate control becomes an important factor in the purchase of modern, heavy duty, motor transport vehicles. Day by day, fleet operators in ever increasing numbers are displaying brake consciousness to a marked degree.

Realizing the growing demand for a sure, quick, powerful stopping force . . . the necessity for a perfect balance of modern motor power, the more prominent manufacturers of commercial vehicles are featuring Bendix-Westinghouse Automotive Air Brakes as standard equipment. Such wide-spread acceptance of Bendix-Westinghouse control is in itself a tribute to its remarkable effectiveness.

Always ready to give you actual facts and figures, relative to the advantages of perfectly balanced Air Brake Control, when purchase of new equipment is contemplated . . . or to assist you in modernizing units now in service, a carefully trained force of power brake engineers is available to the operator. This service is in no way obligatory and may be had by addressing the BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY at Pittsburgh, Penna.

Under the hood of this modern coach is mounted the sturdy Bendix-Westinghouse compressor. The heart of the Air Brake, this remarkably efficient device furnishes a never-failing air source for the braking system, air horns, and other pneumatic equipment.

BENDIX-WESTINGHOUSE
Automotive
AIR BRAKES

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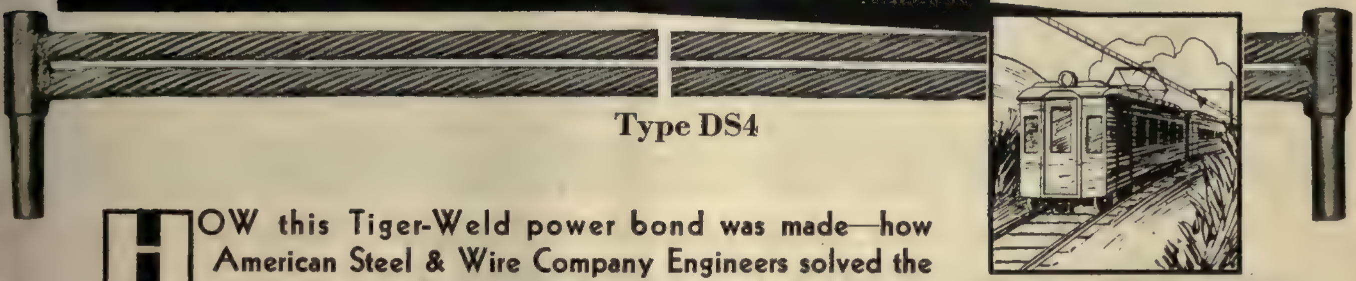
Now . . a new Power Bond with Strength to Spare . . Yet Capable of Carrying Necessary Current Loads . .



Type DS4

HOW this Tiger-Weld power bond was made—how American Steel & Wire Company Engineers solved the problem of strength—without sacrificing the ability to carry necessary current—is a story of achievement that you will want to know about in detail. Especially so—since its inception means increased efficiency and lower operating costs. It will pay you to write for interesting literature and detailed information.

Designed for use on multi-tracked A. C. systems. The Pennsylvania Railroad adopted Type DS-4 Bonds for the electrification from North Philadelphia to Trenton and Norristown.

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POWER BONDS

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY UNITED STATES STEEL CORPORATION

208 S. La Salle Street, Chicago

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- McArthur Turnbuckles
- Manganese Brake Heads
- Manganese Truck Parts

Here's why!—Boyerized Parts reduce replacements 50 to 75%—last 3 to 4 times as long as ordinary parts. Less frequent replacing of parts cuts down that big maintenance item—Labor—too.

The tremendous wear-absorbing qualities of these parts are due to "Boyerizing"—a special hardening process.

Read over the list—keep these parts in mind. Better still—order a few Boyerized Parts for trial—see how slowly they wear out.

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J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

GOOD PRACTICE

CONTINUOUS JOINT BARS FOR WELDING

THE RAIL JOINT CO.
165 Broadway, New York, N. Y.

Illustration: The SIXTH STREET BRIDGE over Allegheny River at Pittsburgh, Pa., selected by a national jury appointed by AMERICAN INSTITUTE OF STEEL CONSTRUCTION as the most beautiful bridge completed in 1928.

The STRUCTURAL STEEL in the superstructure of this bridge was produced by Carnegie Steel Company, and FABRICATED and ERECTED by

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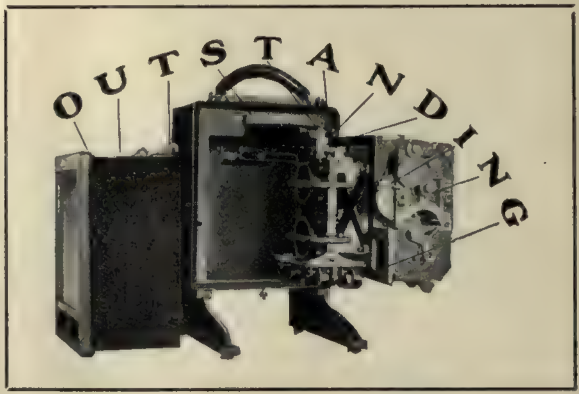
30 Church Street, New York, N. Y.

A "word" to Graphic Instrument users

ABOUT *ROLLER-SMITH* GRAPHICS

O—Cover readily removable.
U—Top window for scale illumination.
T—Cover hinges at top for easy removal and attachment.
S—Scale mounted so as not to interfere with changing of pen.
T—Pen can be grasped at center and removed by turning thumb nut.
A—Ink well can be filled without removal.
N—Cover on ink well protects ink from dirt.
D—Ink well instantly removable without tools.
I—Entire electrical mechanism can be swung open for inspection.
N—Timing gears accessible from front.
G—Efficient damping by means of large magnets.

Every feature listed; *and many others not mentioned*, are included in new Bulletin No. G-830. Send for it.



Over thirty-five years' instrument experience is back of

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Electrical Measuring and Protective Apparatus

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The 150 New Cars for Baltimore
Get EARLL Catchers

BROOKLYN & QUEENS have ordered 300 EARLL Catchers since last October, and now have 1650 in operation.

BOSTON ELEVATED have 2500 EARLL Catchers in operation.

NEW YORK STATE RAILWAYS use EARLL Catchers or EARLL Retrievers on all their city, and interurban, and trolley bus lines.

CAPITAL TRACTION CO. use EARLL Retrievers on all their over-head lines.

WEST PENN POWER CO. have 130 cars equipped with EARLL Retrievers.

ILLINOIS POWER & LIGHT CORP. in 1928 began to replace the retrievers they were then using with EARLLS. They now have 175 EARLL Retrievers in operation.

In 16 countries EARLL Trolley Catchers and Retrievers are giving the utmost in service with a minimum of attention and maintenance.

Simple—light-weight—quick—certain in action, these two devices are indispensable to good trolley car service. They facilitate operation, make faster schedules possible, protect overhead, poles and rolling stock.

General Foreign Agents:
International
General Electric Co.
Schenectady, N. Y., U. S. A.

C. I. EARLL
YORK, PA.
U. S. A.

In Canada:
Railway & Power Eng.
Corp., Ltd.
Toronto, Ont.

Protect Your Crossings
with
NACHODS

BE ready for the heavy auto traffic.

You can conceive of no better protection than Nachod Highway Crossing Signals. They are on the job 24 hours of the day with arresting warnings—flashing red lights—with bells added if desired.

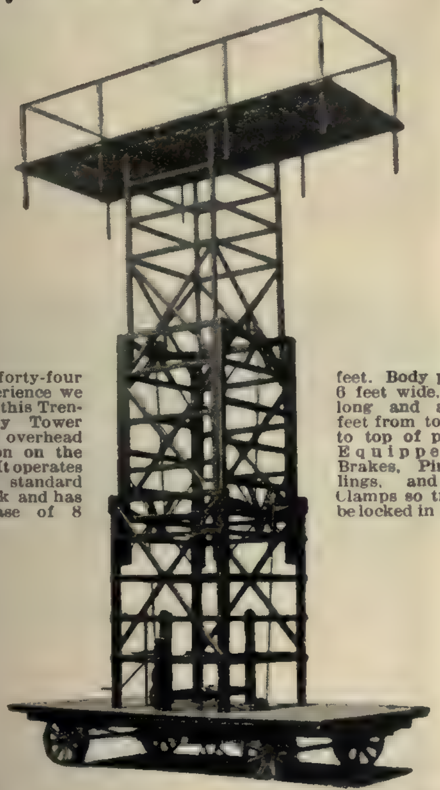
Indicators are provided also to show the motorman he has started the warning.

Built of sturdy iron pipe construction; carrying powerful red projectors; iron relay box with all wiring enclosed; and operated by long tested overhead trolley contactors, Nachod Highway Crossing Signals are the ultimate in safety for *your road.*

Nachod and United States Signal Co., Inc.
4777 Louisville Ave., Louisville, Ky.

We also manufacture: Turn-right Signals, Signals for Single and Double Track, Stub End Signals, Annunciator Signals, Headway Recorders.

THERE'S A TRENTON TOWER
for Railway Work, too!



From our forty-four years' experience we have built this Trenton Utility Tower to handle overhead construction on the railroads. It operates on ARA standard gauge track and has a wheelbase of 8 feet. Body platform 6 feet wide, 12 feet long and about 2 feet from top of rail to top of platform. Equipped with Brakes, Pin Couplings, and Rail Clamps so truck can be locked in position.

J. R. McCARDELL AND COMPANY
391-401 SO. WARREN ST., TRENTON, N. J.

The New
International
R13
CAR
and
BUS
Register

Your registers are important whether you are operating few or many street cars or buses. You need the utmost in dependability and durability. The new International R13 is the culmination of 40 years of register experience. Make your comparison on the basis of the following points:

- Easily mounted and locked in place. No separate operating back required.
- Positive in action, being gear driven throughout. No ratchets to cause trouble.
- Large size unbreakable drawn brass bell.
- Trip figures 1¼ inches high, easily read.
- All parts made of cold rolled or cold drawn steel. No die castings or sand-castings used.
- Bronze Bushings for all important bearings. An exclusive International feature.
- Heat treated alloy steel parts at points of maximum wear.
- Levers broached and mounted on square shafts. No soldered parts.
- Only compression springs used, eliminating spring failures.
- Heavy plate glass face, practically indestructible.

Handsome, Compact, Easily Operated
WRITE FOR COMPLETE DETAILS
The INTERNATIONAL
Register Company
11 South Throop Street Chicago

THE PEREY

STREET CAR

COINPASSOR

in service

Don't experiment—install the Coinpassor and solve the fare collection and passenger loading problem, at one stroke. This is a proved and practical device, the combination of Perey's years of experience in turnstile design.

Photograph shows the Perey Street Car Coinpassor on the job in the new cars of the Brooklyn and Queens Railroad. One hundred of them going into service now. You are invited to make your own inspection of this Brooklyn installation if you care to.

How little space it takes! Just a slender arm across the passage entering the main body of the car. Plenty of room for people to pile onto the platform, close the doors and get the car moving, letting the operator run the car while the Coinpassor collects the fares.

How quickly it operates! Not the slightest delay! Collects the fares as fast as people can walk through.

How safe it is! Just four small arms of smooth and carefully shaped chromium plated steel rods, without an angle or corner anywhere.

Write for details and estimates.

ADVANTAGES

1. Makes one-man operation practical on cars of every size and type.
2. One-man operator can handle larger crowds without delay.
3. No rider can evade fare by slipping past the operator—the coinpassor forces all to pay.
4. Relieves operator of responsibilities for collection and registration of fares—he only has to make change and issue transfers.
5. Platform entrance well can be as large as desired.
6. Front, center or rear exit can be used with treadle operator.
7. Utilizes available platform space effectively.
8. Fast as the movement of passengers.

PEREY

MANUFACTURING CO.

101 PARK AVENUE, N. Y. C.

PANTASOTE

TRADE MARK

—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

Standard
for electric railway cars
and motor buses

Samples and full information gladly furnished.

The PANTASOTE COMPANY, Inc.
250 Park Avenue NEW YORK

N-L

Ventilators

Tail Lights

Track Sanders

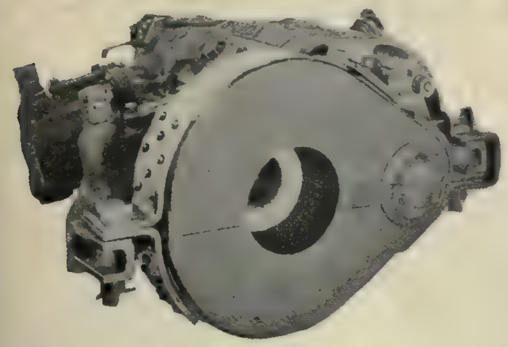
Directo Door Signal

Universal Lanterns

(Safety and Signal)

Write for detailed Information.

The Nichols-Lintern Co.
7960 Lorain Ave. Cleveland, Ohio



A few of the recent

NEW EQUIPMENTS

to use

CHILLINGWORTH

DRAWN STEEL GEAR CASES

The chief factors being
they save considerable weight,
are durable and economical,
thus fulfilling our slogan

Cleveland Railways Co.
New York Board of Transportation
United Electric Railways of Baltimore
Pennsylvania Railroad
Delaware & Lackawanna Railroad
Reading Railroad Co.
Electric Bond & Share Co.

"Maximum gear and pinion protection at minimum cost"

An achievement of 25 years of accumulative development and improvement.

CHILLINGWORTH MANUFACTURING CO., Jersey City, N. J.

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Canada—Railway & Power Eng. Co.
England—Tool Steel Gearing & Equip. Co.
New York—J. W. Gerke
France—A. P. Champin

PIONEER BUILDERS OF STEEL PASSENGER CARS

for

Electric and Steam Railroads

Triplex Articulated Cars Built for New York Rapid Transit Corporation

PRESSED STEEL CAR COMPANY

NEW YORK PITTSBURGH CHICAGO ST. LOUIS ST. PAUL

POLES FROM UP HIGH - THE BEST SOURCE OF SUPPLY
high altitude

Selected poles from Bell owned timber lands

BELL OWNED TIMBER LANDS

EXPERIENCED POLE MAKERS

PROPER HANDLING

EXPERT BUTT TREATMENT

CLEAN YARDS

SHIPPING FACILITIES

Bell ships guaranteed grade poles *QUICKER*

The Bell organization obtains its supply of poles from high up in the mountains of interior British Columbia. It is in this high altitude section that Bell-owned timber lands are located. The Bell organization actually gives you a *selective pole service.* Growth at high altitudes affords high tensile strength and exhaustive tests have established that *these* cedars are uniformly strong and durable.

Butt treatment is highly important as concerns pole durability. By careful study and experimentation we developed a PENTRATE machine which insures best possible results in butt treatment. We can furnish any kind of incising or spacing of the incisions desired.

We also butt treat poles by all other standard methods desired by users.

BELL LUMBER & POLE CO.
MINNEAPOLIS, MINN.

- - - **Bell** - - -

WESTERN RED *and* NORTHERN WHITE
CEDAR POLES
AND TIES

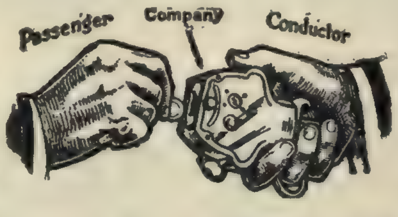
Fare Collection,

to avoid the old temptations and leaks, *necessitates the coin-slot mechanism.*

Coin - insertion causes *instantaneous* registration *by the patrons.* NICKELS, DIMES, QUARTERS or TOKENS—all or in various combinations, are paid into the *one* coin-slot—the different values being instantly assured your treasury.

MONEY METERS are furnished in either *portable* or *stationary* form and are mechanically unbeatable for trolleys and buses.

This *at-the-source* protection will probably add 4% to 10% to your present passenger income.



Money-Meters, Inc. (Successor to Rooke Automatic Register Co.)
3209 Book Tower, Detroit, Mich.

July Convention Report Issue Closes June 24th

Early Receipt of copy and plates will enable us to serve you best—to furnish proofs in ample time so changes or corrections may be made if desired.

ELECTRIC RAILWAY JOURNAL

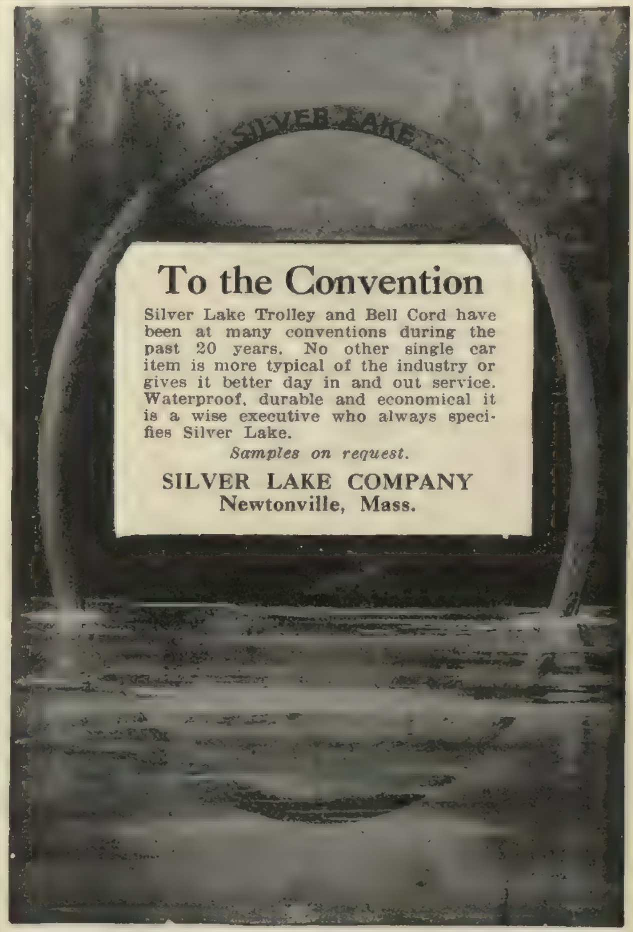
Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400. Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



To the Convention

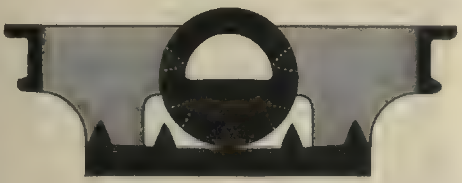
Silver Lake Trolley and Bell Cord have been at many conventions during the past 20 years. No other single car item is more typical of the industry or gives it better day in and out service. Waterproof, durable and economical it is a wise executive who always specifies Silver Lake.

Samples on request.

SILVER LAKE COMPANY
Newtonville, Mass.

STUCKI SIDE BEARINGS

SPECIAL CARBON STEEL
HEAT TREATED

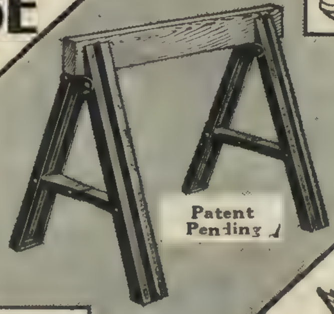


LARGE WEAR SURFACES
FREE ROLLER
ONLY TWO PARTS

A. STUCKI CO.
OLIVER BLDG., PITTSBURGH, PA.

Canadian Representative:
The Holden Co., Ltd., Montreal, Canada

TOLEDO
Folding Steel
HORSE



For barricades, manhole protection, detour signs — for every type of barrier and a score of other purposes, use the quickly erected, economical TOLEDO Folding Steel Horse — strong, rigid, easily handled.

If your dealer can't supply you, write us for prices.

TPS The Toledo Pressed Steel Co.
TOLEDO OHIO
Save with Steel

SEARCHLIGHT SECTION

EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch $6.00
2 to 3 inches.............. 5.75 an inch
4 to 7 inches.............. 5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

POSITIONS WANTED

ARMATURE winder well experienced with railway equipment desires change. Reference. PW-217, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

ENGINEER: Twenty years' experience with large eastern company as superintendent M. of N. and division manager would like to make change. PW-216, Electric Railway Journal, Tenth Ave. at 36th St., New York.

WANTED

Railway-Equipment
Power Plants
Rails and Overhead

Be sure to get our bid.
Dismantling done by us.

The Allite Corporation
636-38 Broadway, New York

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire railroads and street railways. Also industrial and public service properties which have ceased operation. We furnish expert appraisals on all such properties.

May We Serve You?

The Perry, Buxton, Doane Company

(Capital $1,000,000.00)

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.

Pacific Sales Office—Failing Building, Portland, Oregon

WANTED
SNOW SWEEPER
1—Double Truck.
PASSENGER CARS
5—Lightweight Double Truck.
W-215 Electric Railway Journal
Tenth Ave. at 36th St., New York City

FOR SALE
1000 K.W.
SYNCH. MOTOR GEN. SET

Modern type Westinghouse 575 v. D.C., 3 ph., 60 cy., 2,200 v., .8 P.F., A.C. 900 r.p.m. Motor Generator Set with Dir. Conn. Exciter and complete A.C. and D.C. Switchboards. Condition 95% New.

JOHN D. CRAWBUCK COMPANY
Empire Bldg., Pittsburgh, Pa.

"SEARCHLIGHT"

IS

Opportunity
Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"Think SEARCHLIGHT First"

HIGHEST PRICES PAID FOR ELECTRIC RAILWAYS FOR—

DISMANTLING

M. K. FRANK
Clark Building,
Pittsburgh, Pa.
220 E. 42d Street,
New York,
N. Y.

Railway
Equipment
BOUGHT SOLD EXCHANGED
All types of
CARS, MOTORS, TRUCKS, PARTS,
POWER HOUSE EQUIPMENT

Send us your inquiries and offerings

G. T. ABEL
393 Seventh Avenue, New York City

MAKE YOUR SELECTION

FROM 173 BIRNEY CARS

(60 May Be Sold)

Built by J. G. Brill Co.; Brill 79 E-1 Trucks; Full Safety Devices. Either Westinghouse No. 508 or Gen. Elec. No. 264 Motors. Complete with all appurtenances.

Now in Operation *Splendid Condition* *Low Price*

MORE THAN
20 YEARS
AT YOUR
SERVICE

For Complete Information Write:

W. M. McKEE CO.
601 Commonwealth Bldg., PHILADELPHIA, PA.

We hope you will enjoy the A. E. R. A. Convention

While there you will be in close touch with the most progressive men in your field. Many papers dealing with the latest practice will doubtless suggest marked economies that can be duplicated at least in part on your own system, by modernizing some of its equipment.

REMEMBER—that you can obtain up-to-date power plant, trackage, electrical and rolling stock equipment in the finest condition from us at savings that will enable you to purchase even if your available appropriation is limited.

We Buy Electric Railways and their EQUIPMENT

We have recently purchased the AUBURN & SYRACUSE RAILROAD CO., NEW YORK, and offer at exceptionally low prices the following:

Six Light Weight Double Truck
Cars (2 to 5 years old)
Six Birney Cars
Sweepers and Rotary Plows
Freight Cars
Boring Mill
Rotary Converters:
25 and 60 cycle,
300 kw. 400 kw. 500 kw.
Motors:
76, 12-A 101B, 264-A
121, 200-J 508A
Controllers:
K-6 K-10 K-35G K-36-J
Compressors:
DH 16 CP 25 DH 25
Fare Boxes:
Johnson Cleveland
Large Quantity New Materials
and Supplies.

We can make you an attractive Cash Offer for your entire system or any part thereof, including all electrical and mechanical equipment, trackage, overhead and rolling stock. Dismantling is done by us.

We will be pleased to inspect and appraise your railway property and to submit a fair bid for your consideration, without obligation.

H. E. SALZBERG COMPANY, INC.

225 BROADWAY *ESTD. 1898* NEW YORK CITY

Your Best Market
for
Old Trolley Cars and Equipment
Reliable Service

L. SCHIAVONE & BONOMO BROS., Inc.

Jersey City New Jersey

FOR SALE

At Very Reasonable Price

Twenty-One Interurban Standard Passenger Cars

10—Cars Equipped with West. 303 Motors, Brill Standard C-80 Trucks, Seating Capacity—Fifty.

11—Cars Equipped with West. 76 Motors, Peckham Trucks. Seating Capacity—Fifty-two.

All in Good Operating Condition

For Particulars Apply

George Garland, *Purchasing Agt.*
Eastern Michigan System,
14401 Third Ave., Highland Park, Mich.

FOR SALE

SAFETY CARS

3—Modern Double Truck Lightweight one-man.

RHODES RAILWAY EQUIPMENT CO.
Times Building, New York, N. Y.

New "SEARCHLIGHT" Advertisements

must be received by 5 P.M. the 20th of the month to appear in the issue out the following month.

Address copy to the Searchlight Department

Electric Railway Journal
Tenth Ave. at 36th St., New York City

"Opportunity" Advertising:
Think *"Searchlight"* First!

Saving is a good habit, BUT—
Why Save Things You'll Never Use?

WHY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

TODAY you can turn them over at a fair price. Tomorrow they will be—JUNK. Is it not the better part of good horse-sense to dispose of them NOW?

6000 other electric railway men will see your advertisements of used or surplus equipment and materials here—in the Searchlight Section of their business paper.

Some of these men—officials or executives of other lines in other parts of the country and operating under different conditions—can use what you no longer need. For an insignificant investment you can tell these others what you have. And they will buy.

One "Searchlight" advertiser wrote, "We can cheerfully recommend the Searchlight Section as a wonderful medium for reaching buyers of rails and equipment." Another—"The strongest proof that your 'Searchlight' finds its way to many readers is shown by the numerous letters we have received in answer to our recent ad."

Let us tell you the cost of advertising your used or surplus equipment and materials in the Searchlight Section. Just address a list of what you have to dispose of to the

Searchlight Department

ELECTRIC RAILWAY JOURNAL
Tenth Ave. at 36th St., New York, N. Y.

ERJ-881

ENGINEERS and CONSULTANTS

Ford, Bacon & Davis
Incorporated

Engineers

39 Broadway, New York
PHILADELPHIA CHICAGO
SAN FRANCISCO
NEW ORLEANS

ALLIED ENGINEERS, Inc.

Engineers and Constructors

120 Wall Street
New York

Transportation Examinations and Reports

THE BEELER ORGANIZATION
Engineers and Accountants
JOHN A. BEELER, DIRECTOR

Traffic — Traction
Bus-Equipment
Power-Management
Appraisals Operating and Financial Reports

Current issue LATE NEWS and FACTS free on request

52 Vanderbilt Avenue, New York

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS

EXAMINATIONS
REPORTS-APPRAISALS-RATES
OPERATION-SERVICE

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Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance

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1004 First National Bank Bldg.

NEW YORK
49 Wall Street
Phone: Hanover: 2142

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CONSULTING ENGINEER
TRANSPORTATION
UTILITIES

Transit-Traffic Development Surveys. Street Plans, Controls, Speed Signals. Economic Operation, Schedule Analyses, Bus Co-ordination, Rerouting. Budgets, Valuation, Rate Cases and Ordinances.

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CONSULTING ENGINEER
111 W. WASHINGTON ST., CHICAGO

TRANSIT DEVELOPMENT
OPERATING PROBLEMS—
TRAFFIC SURVEYS
VALUATIONS

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells
Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING
Reorganization Management
Operation Construction

50 East 42nd St., New York City

BYLLESBY ENGINEERING and MANAGEMENT CORPORATION

231 S. La Salle Street, Chicago
New York Pittsburgh San Francisco

SANDERSON & PORTER
ENGINEERS
for the
FINANCING—REORGANIZATION
—DESIGN—CONSTRUCTION
of
INDUSTRIALS and
PUBLIC UTILITIES

Chicago New York San Francisco

The P. Edward Wish Service

50 Church St., NEW YORK

Street Railway Inspection
DETECTIVES

131 State St., BOSTON

WALTER JACKSON

Consultant on Fares
and Motor Buses

The Weekly and Sunday Pass
Differential Fares—Ride Selling

Holbrook Hall 5-W-3
472 Gramatan Ave., Mt. Vernon, N. Y.

Competent to solve cleaning problems

ASK us about your car and motor repair cleaning problems that seem to defy solution. From our long experience in serving electric railway systems, we can suggest suitable Oakite materials and methods for overcoming the difficulty.

Our nearest Service Man will gladly study your cleaning requirements and recommend the most effective and economical Oakite material for saving time and effort in cleaning cars, large and small truck and brake parts, motor parts, etc. A postal to us will bring him to your shop.

Manufactured only by

OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

Oakite Service Men, cleaning specialists, are located at

Albany, N. Y.; Allentown, Pa.; *Atlanta, Baltimore, *Boston, Bridgeport, *Brooklyn, N. Y.; Buffalo, *Camden, N. J.; Charlotte, N. C.; Chattanooga, Tenn.; *Chicago, *Cincinnati, *Cleveland, *Columbus, O.; *Dallas, *Davenport, *Dayton, O.; Decatur, Ill.; *Denver, *Des Moines, *Detroit, Elmira, N. Y.; Erie, Pa.; Flint, Mich.; Fresno, Cal.; *Grand Rapids, Mich.; Harrisburg, Pa.; Hartford, *Houston, Texas; *Indianapolis, *Jacksonville, Fla.; Jackson, Mich.; *Kansas City, Mo.; *Los Angeles, Louisville, Ky.; Madison, Wis.; *Memphis, Tenn.; *Milwaukee, *Minneapolis, *Moline, Ill.; *Montreal, Newark, N. J.; New Haven, *New Orleans, La.; *New York, *Oakland, Cal.; *Oklahoma City, Okla.; *Omaha, Neb.; *Philadelphia, *Pittsburgh, Pleasantville, N. Y.; Portland, Me.; *Portland, Ore.; Providence, Reading, Pa.; Richmond, Va.; *Rochester, N. Y.; Rockford, Ill.; *Rock Island, Sacramento, Cal.; *San Francisco, *Seattle, South Bend, Ind.; Springfield, Mass.; *St. Louis, *St. Paul, Syracuse, N. Y.; *Toledo, *Toronto, Trenton, *Tulsa, Okla.; Utica, N. Y.; Worcester, Mass.; Youngstown, Ohio.

*Stocks of Oakite materials are carried in these cities.

OAKITE

TRADE MARK REG U S PAT OFF

Industrial Cleaning Materials and Methods

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The LEEDS-TOZZER CAR WASHER

—The machine that washes the outer sides and windows of your cars quicker and better and at a fraction of the cost of doing this work by hand washing.

The cars are first drenched,—scrubbed by rapidly rotating brushes, and finally rinsed with clean water.

Clean cars, you know, attract riders.

LEEDS, TOZZER & CO., Inc.
75 West St., New York

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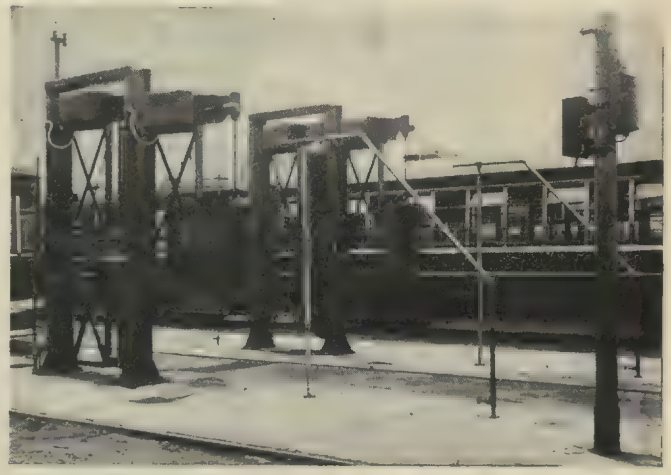


Photos by courtesy Philadelphia Rapid Transit Co. who have five machines.

THIS BENDER CITY PAY-ENTER

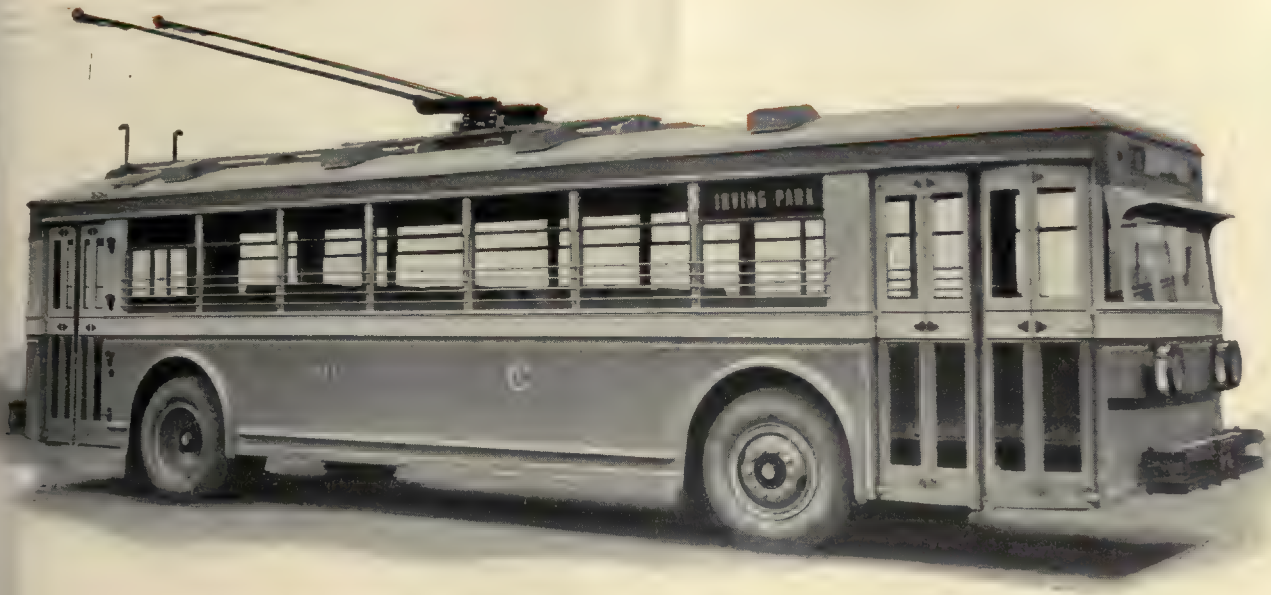
COLLECTS MORE FARES IN RUSH HOURS

IT'S THE CAPACITY of a bus for *extra* fares in rush hours that spells profits . . . This large City Pay-Enter has a big 22-inch aisle, and seat plan can be arranged to provide a generous standing well, in addition to 41 comfortable seats. Operators like it because it carries easily so many additional passengers and because of its Bender quality construction giving long service on the road with but little time in the shop . . . Why not send for complete information about this unit and then decide for yourself how profitably you could adopt it to your particular conditions.

This unit is also furnished with air operated front entrance door and air and treadle operated rear exit door — greatly facilitating the handling of massed transportation.

BENDER BODIES

THE BENDER BODY COMPANY, West 62nd and Denison, Cleveland, Ohio



BRILL TROLLEY BUSES

Thirteen 40-Passenger Type Ordered for Chicago

The answer to one of your problems—for extensions and boulevard service. Flexible enough to avoid traffic delays, yet affording modern electrically-operated transportation service economically and efficiently. Quick in acceleration and smooth in operation.

Practical for rush-hour as well as the off-peak periods—capable at all times of every power demand of load and roadway—designed and constructed for maximum service requirements.

Chicago has introduced the first of these modern Brill-built Trolley Buses. Thirteen have been ordered. Investigate.

THE J. G. BRILL COMPANY
PHILADELPHIA

American Car Company
St. Louis
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Cleveland

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Springfield, Mass.
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Rialto Building, San Francisco

Consistent Mack performance is the reason for consistent Mack repeat orders from Mack users all over the country—

Take the New York State Railways, for instance—

1924—purchased 2 Mack "AB" Buses
1925—purchased 4 Mack "AB" Buses
1926—purchased 6 Mack "AB" Buses
1927—purchased 5 Mack "AB" Buses
1929—purchased 23 Mack "AB" Buses
1929—purchased 8 Mack "BK" Buses

Everyone of these 48 Mack Buses is in profitable operation today.

MACK TRUCKS, INC.
25 Broadway, New York

Mack

Fourteen recent additions to the Mack fleet of the New York State Railways

LECTRIC RAILWAY JOURNAL

Hill Publishing Company, Inc.
JULY, 1930
Thirty-five Cents per Copy

Detroit inaugurates *trolley bus service*

Westinghouse-equipped trolley buses on Plymouth Road, Detroit.

THE Department of Street Railways of the City of Detroit on June 14, 1930, initiated improved transport service on Plymouth Road from Grand River Boulevard to the beautiful Rouge Municipal Park.

The six new trolley buses accommodate 42 passengers comfortably and are capable of making the 5.8-mile run in 22½ minutes including a 4½-minute layover and all passenger stops.

Operators and patrons are pleased with the following features:

1. Noiseless operation
2. Flexibility of movement
3. Good ventilation
4. Smooth and rapid rates of acceleration
5. Ample speed in traffic
6. Service coordinated with street cars
7. Easy riding

Westinghouse high-speed, type 1426, 50-hp. motors and type VA automatic foot-operated control are essential features of these vehicles.

The trolley bus offers an economical solution to the transportation problems of rapidly growing cities. Request complete information from the nearest Westinghouse office.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31449

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

Electric Railway Journal

Morris Buck
Engineering Editor
George J. MacMurray
Clifford A. Faust
. W. McCloy
Joseph R. Stauffer

Consolidation of
Street Railway Journal and Electric Railway Review

John A. Miller, Jr., *Managing Editor*

Vol. 74, No. 8 *Pages 427-497*

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London, England

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Publishing Director

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AMERICAN ELECTRIC RAILWAY ASSOCIATION
AERA
1930

Member
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with

A SPRING BUFFER

The New US-24-A All-steel Welded Trolley Base

INCLUDING a spring buffer which effectively cushions and dampens the action of a rebounding trolley pole, the new US-24-A trolley base weighs only 77 pounds.

To embody this highly desirable feature and at the same time to hold down the weight, have meant no sacrifice whatever in strength. In fact, the all-steel construction with welded joints provides even greater strength than has been available heretofore in this item of car equipment.

The light-weight reciprocating parts of this base ha quickened trolley pole action and permitted low wheel pressures than were previously possible. Th there is less possibility of dewirements at ears, fro or other hard spots and quieter operation also is o tained. Wear and tear on overhead and equipment a likewise reduced.

With these direct benefits of light weight, the US-24 trolley base also has the advantages of a simplified a sturdy construction, ease of inspection, and negligi upkeep.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped sho

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MEMBER ELECTRIC RAILWAY ASSOCIATION AERA 1930

Westinghouse

WESTINGHOUSE ELECTRIC

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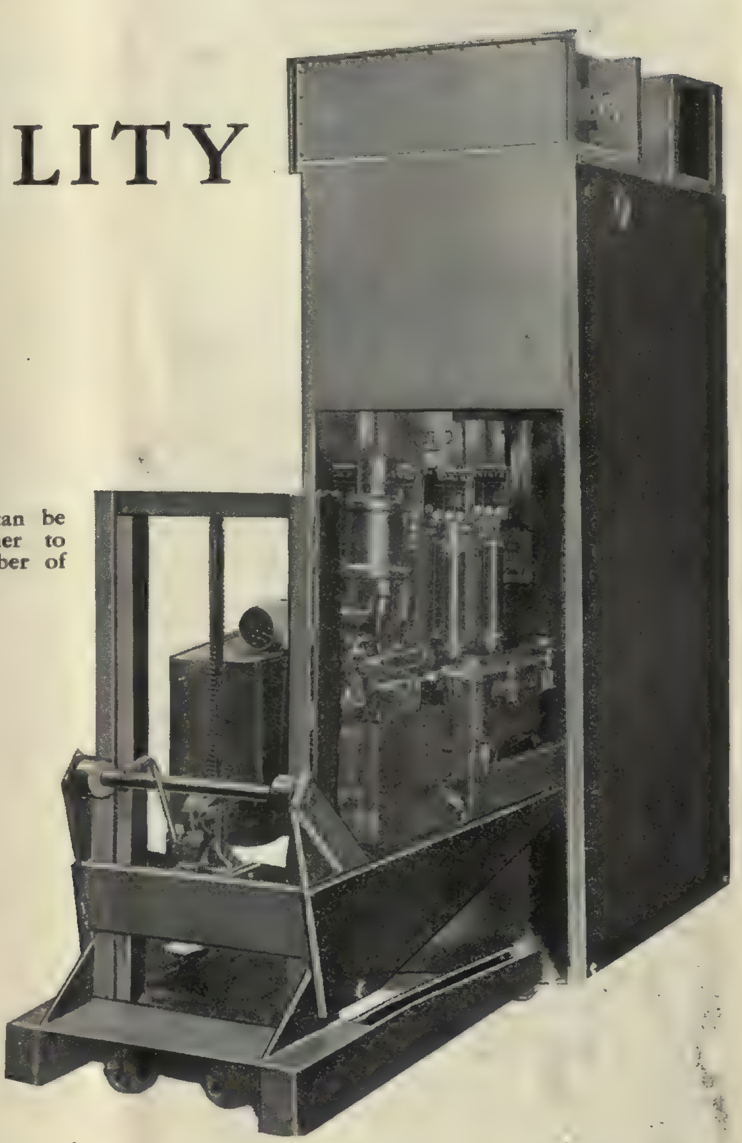
SINGLE RESPONSIBILITY



Units like this can be assembled together to control any number of circuits

FOR general a-c. switching applications, Westinghouse Metal-clad Switchgear has tstanding advantages over the older types f equipment assembled in the field.

s this equipment is completely assembled, ired and tested in the factory by experienced rsonnel, the responsibility for proper nctioning rests with but one manufacturer.

elays and unnecessary tie-up of capital, rmerly resulting from promiscuous buying parts which arrived in the field at various times, partial shipments, are eliminated. This factory-sembled equipment is easily installed and at a nsiderable saving of time and expense. As many nits as the customer has facilities to handle may assembled together for shipment.

interchanging similiar breakers or by utilizing a spare when making an inspection or a change in oil, service interruption is reduced to a minimum.

Mechanical interlocks, totally enclosed bus compartments, and metal barriers protect the operator from electrical hazards.

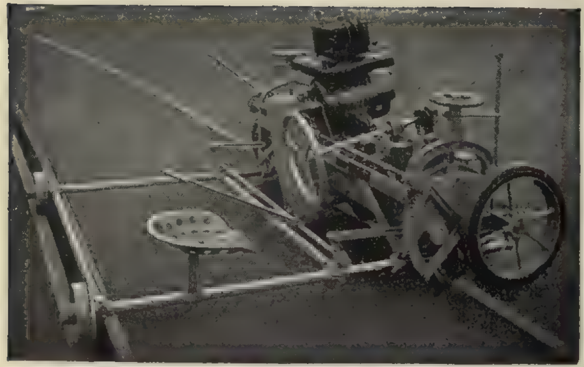
There is a Switchgear Specialist in a nearby Westinghouse office ready to help you—and only for the asking.

ervice, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

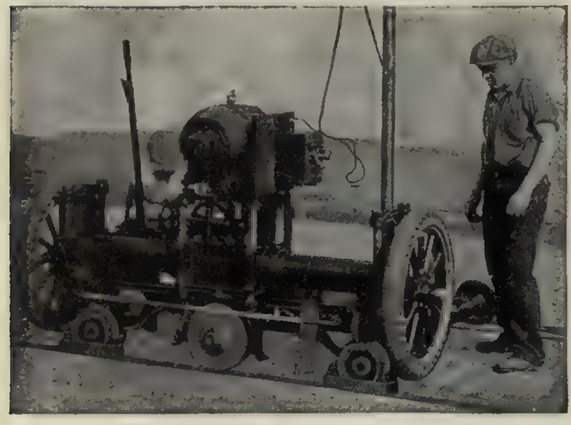
T 31286

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

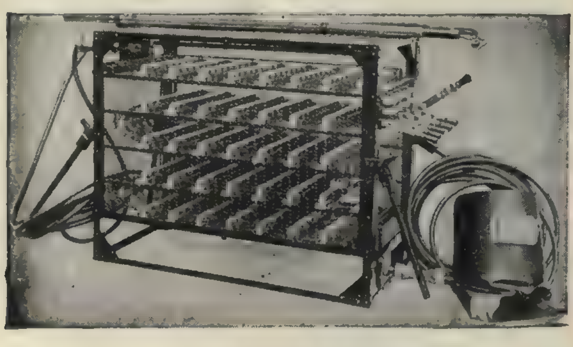


Improved Atlas Rail Grinder

Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Waiting is wasting

Maintenance deferred maketh the purse sick — especially track maintenance.

If you don't want the expensive job of replacing track or track foundation, keep the rails fit.

Grinding and electric arc welding do it.

The tools shown here do it economically.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

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Chas. N. Wood Co., Boston
H. F. McDermott, 208 S. LaSalle St., Chicago
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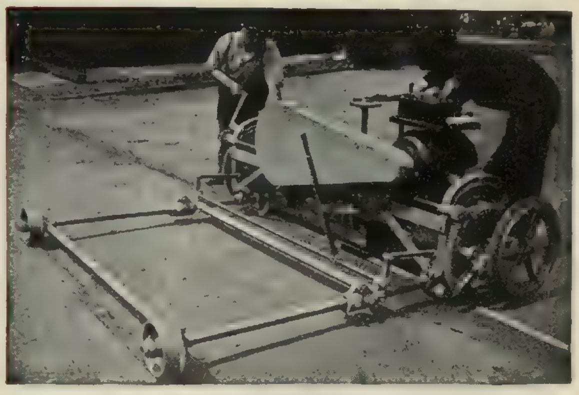
3559

Reciprocating Track Grinder



Vulcan Rail Grinder

Reciprocating Grinder Car, showing one of the grinding units.

RTW Curve Oiler

DETROIT Pick

Overhead Materia

Overhead construction for Trolley Bus service on Plymouth Road, in the northwest portion of Detroit. A combination of O-B Spring Lock Hangers and O-B Type B Hangers, with O-B Marathon Ears, support the overhead.

The method of installing feed-ins to the trolley bus overhead. Connection is made through the boss of an O-B Marathon Ear.

DETROIT has joined the growing list c
portant cities which have improved tra
tation by the introduction of Trolley Bus se
On Saturday, June fourteenth, the first trolley
—or electric coaches, as they are called in Det
started service on Plymouth Road, over a rou
miles long. The route starts at Plymouth Roa
Grand River Avenue, and the present terminus
new River Rouge Park, with its golf course,
courts, swimming pools and other recreations

Six Twin Coach trolley buses will afford first
service for the people of Detroit to this new r
tion center, as well as adequate service to th
idents of the Plymouth Road section. It is
ipated that this route is the beginning of a t
bus system to serve the entire northwest and
east sections of Detroit.

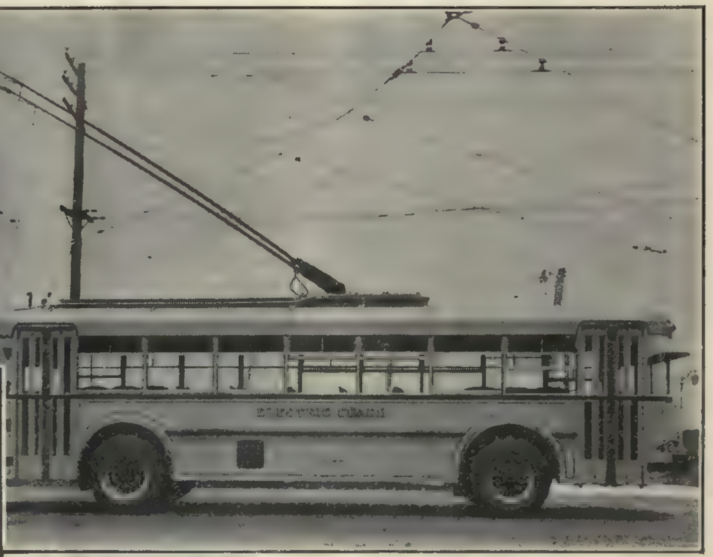
As in Salt Lake City, Chicago, New Orlean
Knoxville, O-B trolley bus equipment and ove
materials have been used extensively in D
Bus equipment includes O-B Dash-Illumin
Headlights, O-B Featherweight (6-spring) T
Bases, O-B Poles, Swivel Harps and Wheel
O-B Retrievers. O-B overhead materials us
clude Marathon Ears, Spring Lock Hangers,
B Hangers, Type N Single and Double Curve
ers, Insulated Approaches, Type E Adjustable
overs, and Special Wood Strain Insulators.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada

-B Equipment and

r Electric Coach Service

One of the six electric coaches of the Department of Street Railways, Detroit, for trolley bus service on Plymouth Road. Coaches made by the Twin Coach Corporation. O-B equipment includes Dash-Illuminating Headlights, Featherweight Trolley Bases, Trolley Poles, Swivel Harps and Wheels and Trolley Retrievers.

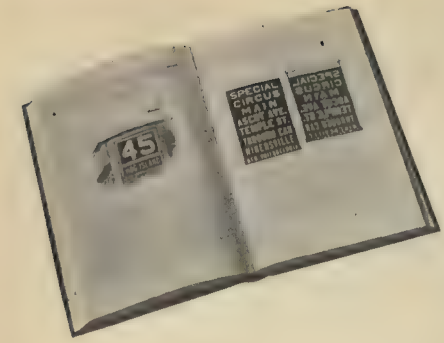


(Right) Crew working on loop at River Rouge Park terminals of the Plymouth Road Trolley Bus line. O-B Single and Double curve hangers, with special wood strain insulators are used.

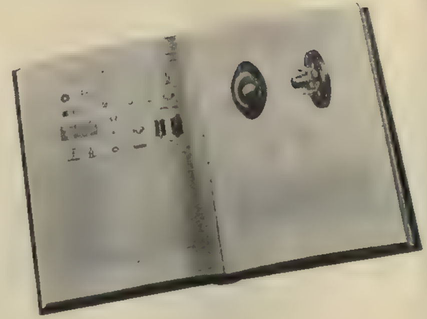
Ohio Brass Co.

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

EW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
ILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE



687 PAGES OF DATA ON CAR EQUIPMENT



CATALOG No. 7, the largest and most extensive catalog on car equipment gives you first hand complete information on the equipment you need in building or rebuilding cars.

Check over the material listed in this book and you will find many items which will make your cars produce greater revenue. New signs or curtains, new passenger signal systems, new interior lighting, new headlights and numerous other specialties are listed.

Always refer to catalog No. 7 when you need car equipment. If you do not have a copy of this book, kindly advise.

SAFETY CAR LIGHTING FIXTURES
GOLDEN GLOW HEADLIGHTS
FARADAY CAR SIGNAL SYSTEM
SAFETY CAR LIGHTING FIXTURES
COMPENSATING SERIES LAMP FIXTURES
INTERNATIONAL FARE REGISTER
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ELECTRIC SERVICE SUPPLIES CO. Manufacturer

RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Home office and plant at 17th and Cambria Sts., PHILADELPHIA; District offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube and Supply Company, Ltd., Montreal, Toronto, Vancouver, Winnipeg.

VIA WIRE FROM COAST

SALT LAKE CITY

"WE think the big question of urban transportation is solved with the modern Trolley Bus. It is QUIET and the most popular service we have ever had. Just have some of your local regulating authorities experience a ride. They will sell themselves."

—**Judge Corfman,** ***Chairman***
Utah State Utilities Commission.

Excerpt from address at
luncheon given to A.E.R.A.
delegates at Salt Lake City.

Twin Coach
BY F.R. FAGEOL KENT, OHIO

VIA WIRE FROM COAST

SAN FRANCISCO

IT was a Trolley Bus convention to an astonishing degree. The prediction was made that the industry in this new vehicle had a potential sensation of the sort it has been searching for for ten years.

As one executive seriously remarked "The Trolley Bus has IT." "We are going to build mighty little new track" was a frequent assertion.

VIA WIRE FROM COAST

LOS ANGELES

BEHIND police sirens a complete train of 40 passenger Twin Coaches owned by the Los Angeles Railway carried the conventionists 39 miles through the traffic and over valley grades to a ranch setting at 50 miles an hour.

"Frank Fageol solved the 'big' motor problem with these dual engine jobs" was the impulsive comment of several of the much impressed A.E.R.A. passengers.

Twin Coach
BY F.R. FAGEOL KENT, OHIO

VIA WIRE FROM COAST

YOUNGSTOWN

THE winning brief for the 1930 Coffin Award submitted by the Youngstown Municipal Railway and prepared by R. N. Graham revealed that their largest and most important bus additions of the last year were 20 big forty passenger Twin Coaches.

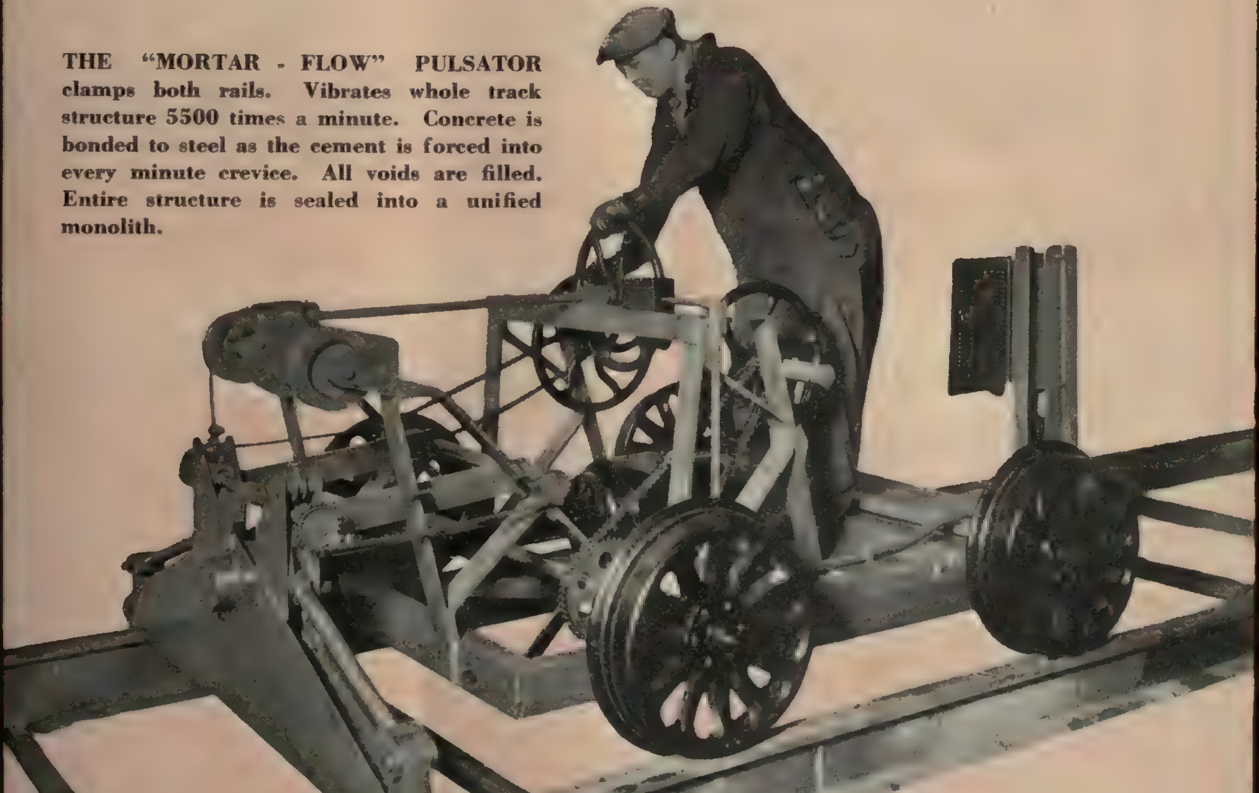
The 1929 Coffin Award winner also was a large user of Twin Coaches.

Twin Coach
BY F.R.FAGEOL KENT, OHIO

UNIFORM PAVED TRACK

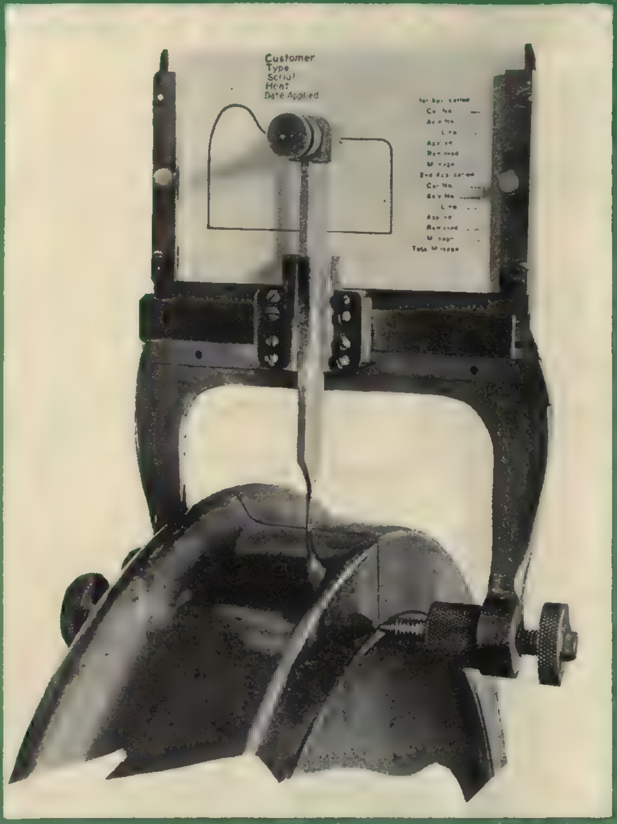
Uniform Paved Track Is Assured By the "Mortar-Flow" Principle of Vibrating Concrete Around the Track Structure.

THE "MORTAR - FLOW" PULSATOR clamps both rails. Vibrates whole track structure 5500 times a minute. Concrete is bonded to steel as the cement is forced into every minute crevice. All voids are filled. Entire structure is sealed into a unified monolith.



INTERNATIONAL STEEL TIE CO. CLEVELAND OHIO

WHAT PRIC



Getting the TRUE PICTURE of CAR WHEELS

Tread and Flange Contours Recorded Graphically

A practice which will enable Every Operator to Develop Comprehensive facts Relating to Life—Service and Ultimate Cost of their Car Wheels.

NACO SPUN STEEL CAR WHEE

Produced Through Application of Sound and Progressive Principles Pertaining to Metallurgy and Manufacture. Actual Service Records Accurately Computed on Many Representative Properties Have Shown Proven Results Favoring:—

1. *"Pull-in"* Records.
2. Demands Imposed by Greater Acceleration and Braking.
3. Reduction in Reclaiming Operations.
4. Lower Maintenance Costs.

THE ULTIMATE CAR WHE

We Solicit Your Inquiries . . .

NATIONAL MALLEABLEAND STEEL CASTINGS C
CLEVELAND, OHIO
Steel Plants: Sharon, Pa.—Chicago and Melrose Park, Illinois

PROGRESS..!

Motor Car—
Pulling Trailer
Single End
Operation
4-40 H.P. Motors
Net Car Weight
38,000 lbs.

Motor Car—
Single End-
Operation
-40 H.P. Motors
Net Car Weight
45,000 lbs.

lotor Car—
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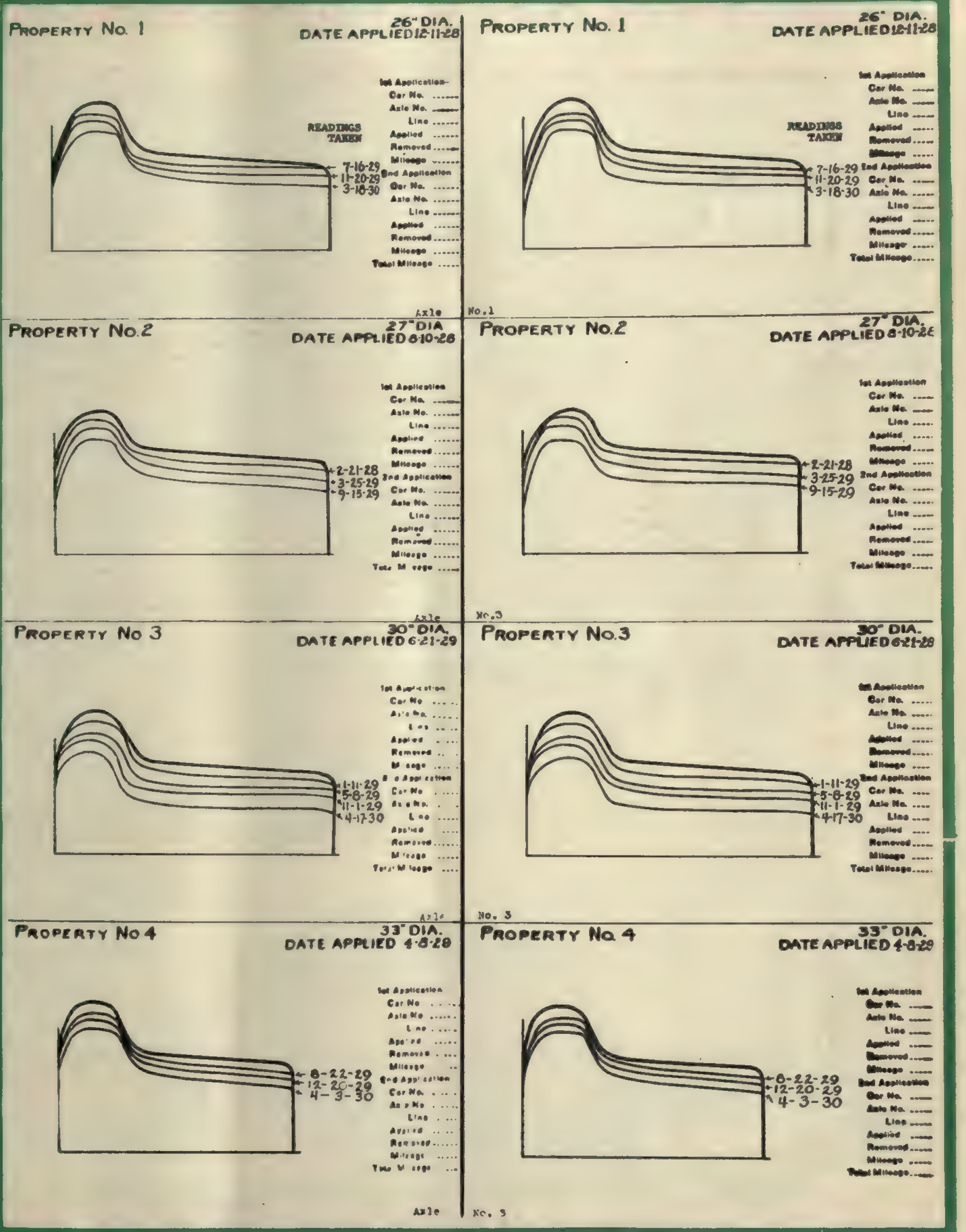
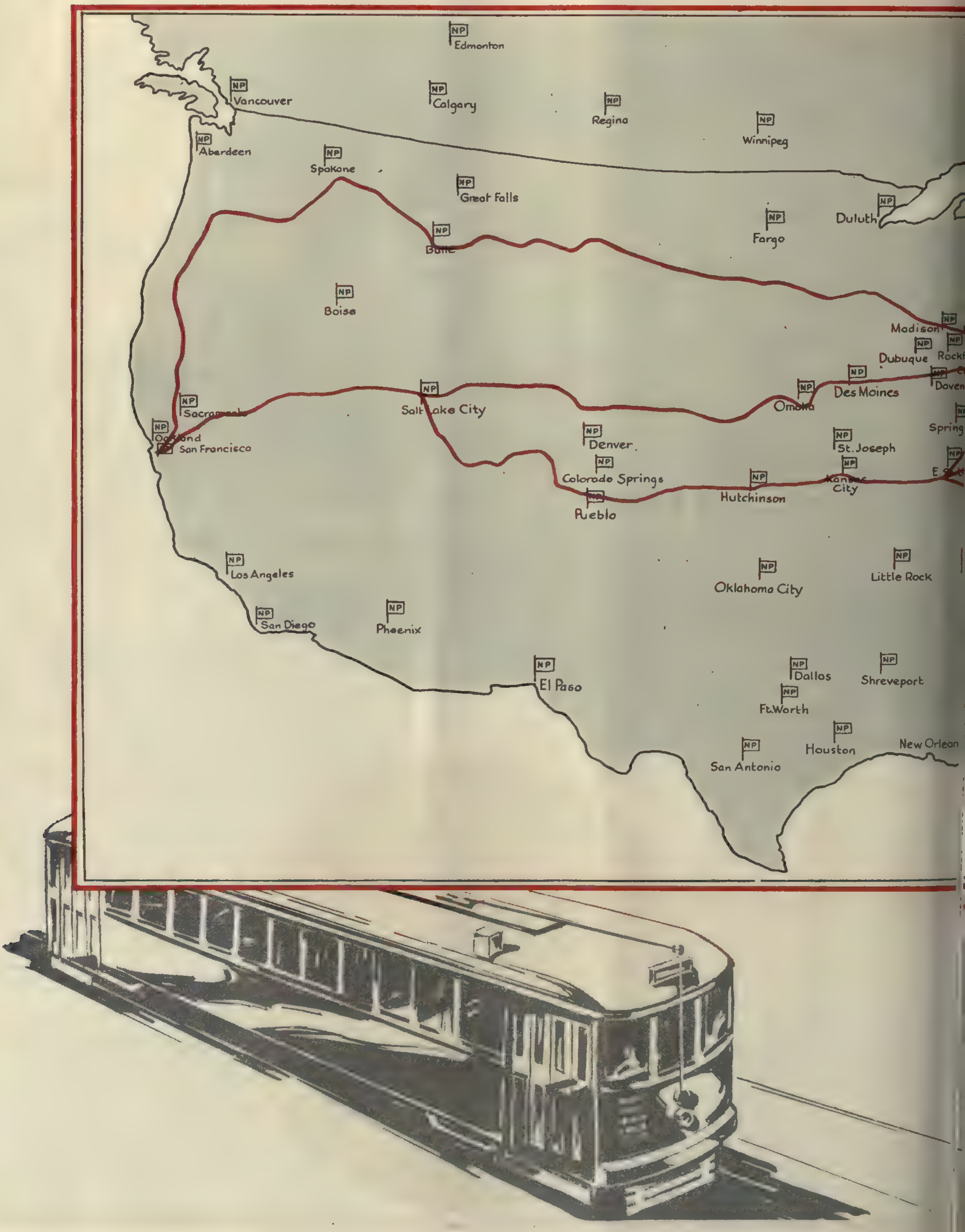


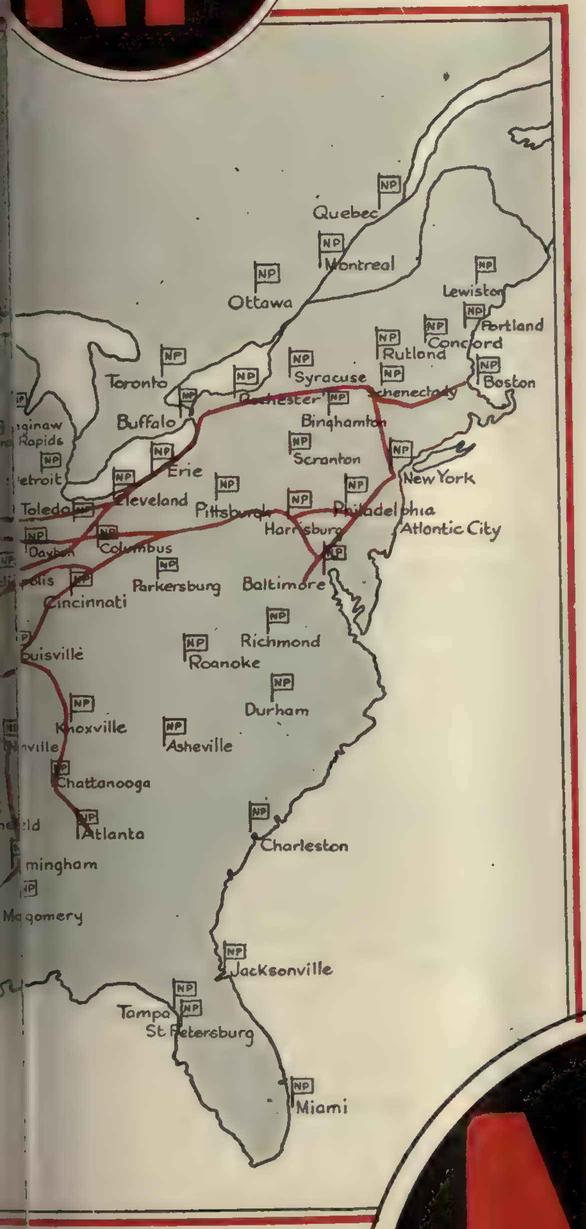
Determining Just What Is Required in a Wheel to Best Meet Local Operating Conditions—An Example of How We Can Be of Assistance in Studying *Your* Individual Wheel Problems Is Demonstrated Herewith by *Actual* Contour Cards *Covering "NACO" Wheels.*

In Each Case They Are for Wheels in Operation on Large City Properties and Are Representative of Balance of "NACO" Wheels in Service.

To the coast and back



NP all the way....

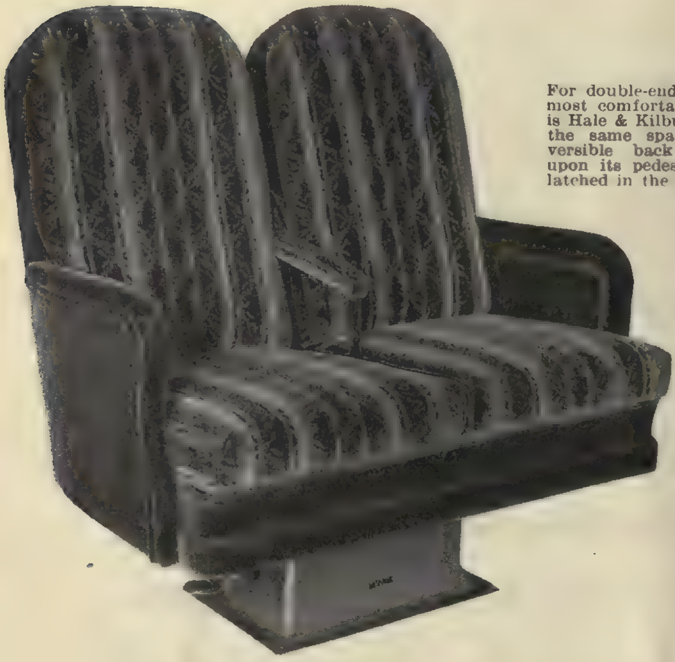


THOSE who attended the *Convention* passed thru innumerable cities where National Pneumatic Door Control Equipment is helping Electric Railways to provide safe, rapid and economical transportation.

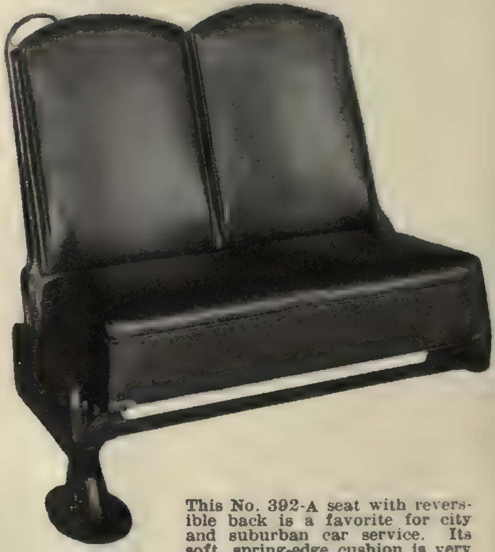
NP

NATIONAL PNEUMATIC CO.

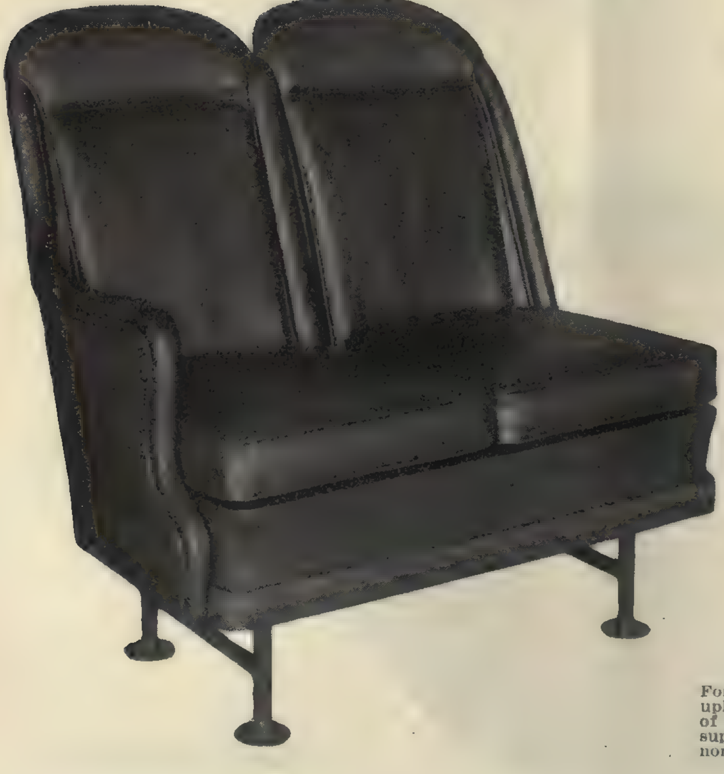
THESE LUXURY SEATS



For double-end and interurban cars the most comfortable of all railway chairs is Hale & Kilburn No. 900. It occupies the same space as the standard, reversible back railroad seat, rotates upon its pedestal and is automatically latched in the desired position

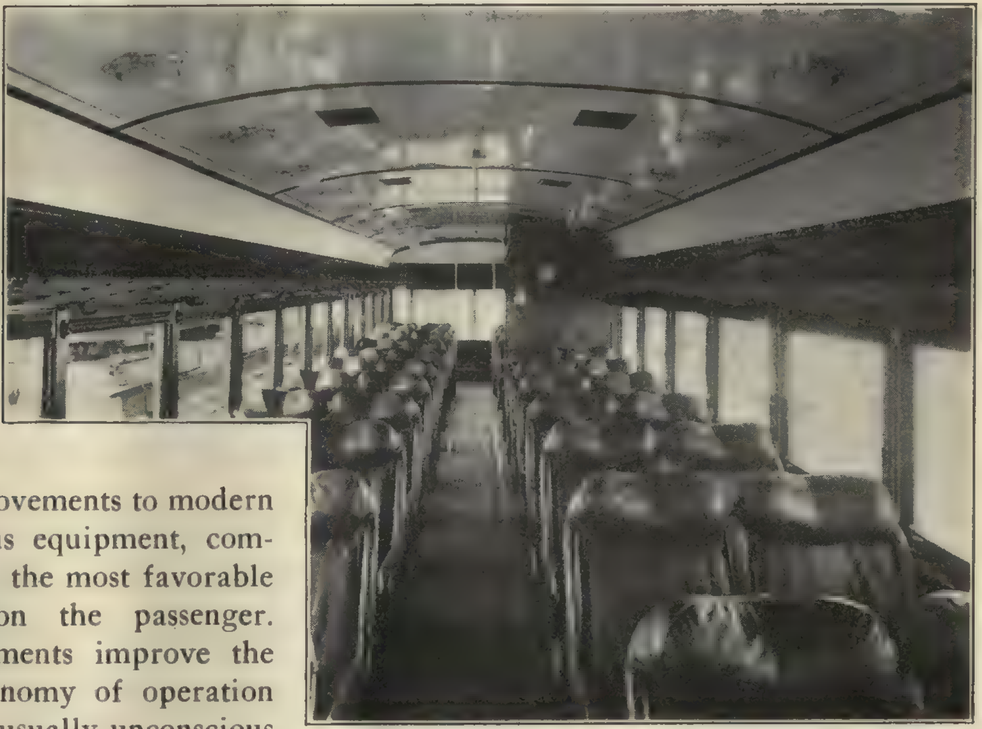


This No. 392-A seat with reversible back is a favorite for city and suburban car service. Its soft, spring-edge cushion is very comfortable—a luxury seat of simple, sturdy construction.



For parlor coach busses, the deep upholstery and strong, light framework of this 900-D double chair make it supremely comfortable and very economical to maintain in bus service.

HAVE EARNING POWER



The Cincinnati and Lake Erie Railroad Company has recently received twenty new cars from the Cincinnati Car Corporation, all of which are equipped with Hale & Kilburn No. 900-D stationary chairs with pillow headrests. This picture shows one of the ten cars used for local interurban service and vividly suggests the comfort of this new equipment.

OF all the improvements to modern trolley car and bus equipment, comfortable seats make the most favorable impression upon the passenger. Mechanical refinements improve the speed and the economy of operation but passengers are usually unconscious of such things—and don't think about them.

On the other hand, Hale & Kilburn seats directly affect earning power. They build good will. They invite people to ride because they actually make passengers realize that railways are catering to their comfort. A general program of replacing old style seats with Hale & Kilburn luxury seating will bring added revenue to your road—and the cost is very reasonable.

HALE & KILBURN SEATS

HALE & KILBURN CO.

General Offices and Works: 1800 Lehigh Ave., Philadelphia

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Hale & Kilburn Co., Graybar Bldg., New York.
Hale & Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta.
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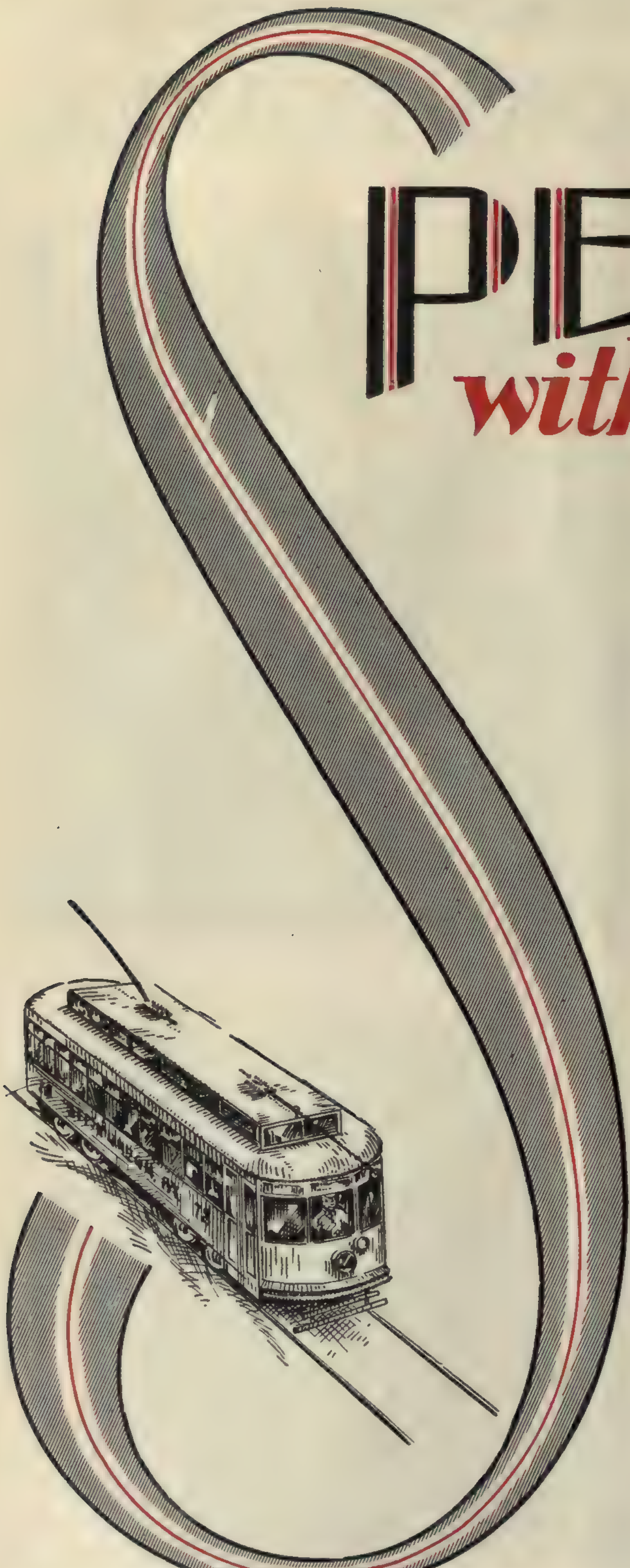
W. L. Jefferies, Jr., Mutual Bldg., Richmond.
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 53 First St., Portland, Oregon



SPEED UP with self-lapping

THE ability to make quick stops in street car service not only assures maximum safety while enabling cars to "hold their own" in the traffic stream, but it permits faster schedules because the peak operating speed can be held longer before deceleration begins . . . Stopping distance can be shortened by cutting down the time of obtaining brake applications from the old basis of three seconds or more to less than one second—with a Relay Valve. This device is of large capacity, and located close to the brake cylinder, so that it directly controls the flow of air to and from the cylinder when actuated by the brake valve—thus speeding up the application and release.

WESTINGHOUSE

General Office and Works,

SCHEDULE

brake valves and relay valves

To assure that the desired flexibility of brake operation may be maintained with the fast times made possible by the Relay Valve, a Self-lapping Brake Valve has been developed . . . With this valve it is possible to obtain a prompt increase or decrease of pressure merely by a slight movement of the handle in the proper direction—there is no need to move the handle to service position and back to lap as with the usual form of valve. Brake manipulation is therefore greatly simplified, and quick applications can be properly controlled throughout the range of pressures from minimum to maximum. ✓ ✓ ✓ ✓

TRACTION BRAKE CO.

Wilmerding, Pennsylvania.

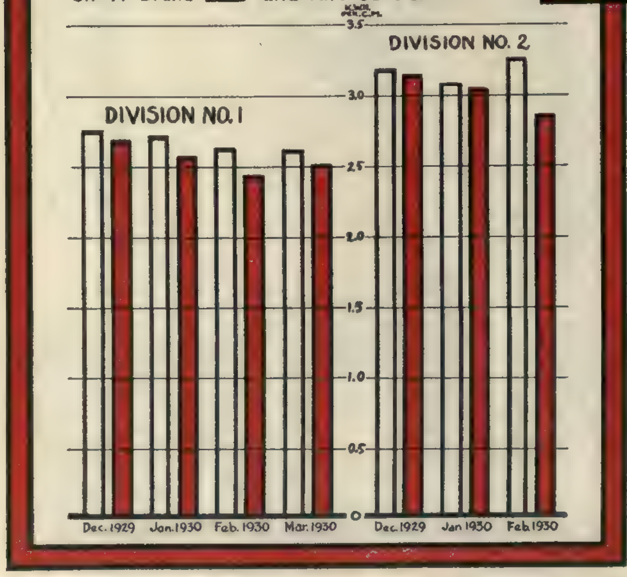
Large City Street Railway

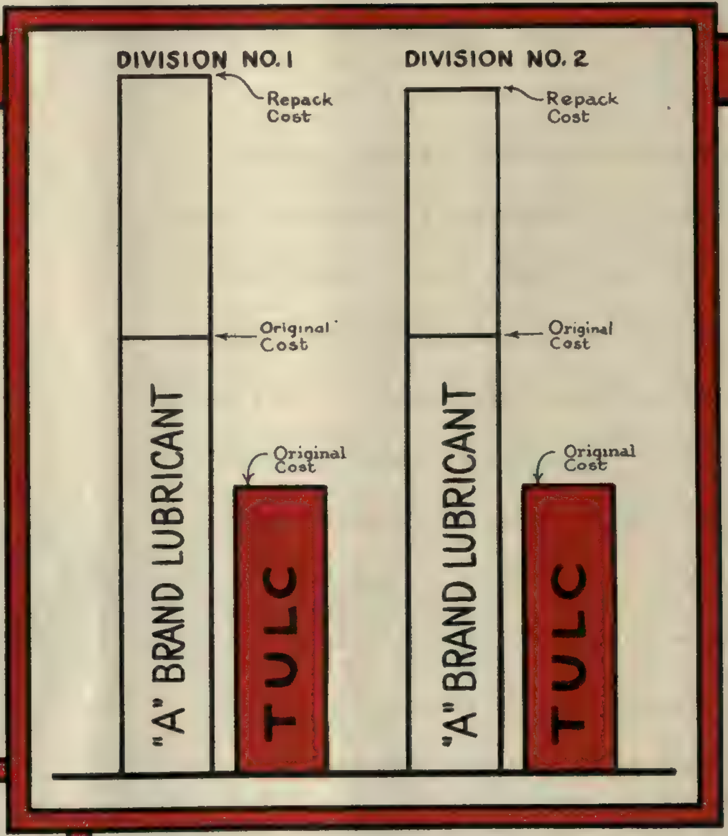
makes a comparative test of Tulc... and proves again the superiority of Tulc for journal bearing lubricating

ON November 25th, 1929, two cars started from Division No. 1 and Division No.2, identical as far as equipment and service.

They differed only in the lubrication of their journal bearings. One car from each station was lubricated with Brand "A", a well known lubricant; the remaining two were lubricated with Tulc. The maximum time consumed by the comparative test was 116 days.

The chart below tells the Power Saving Story . . .





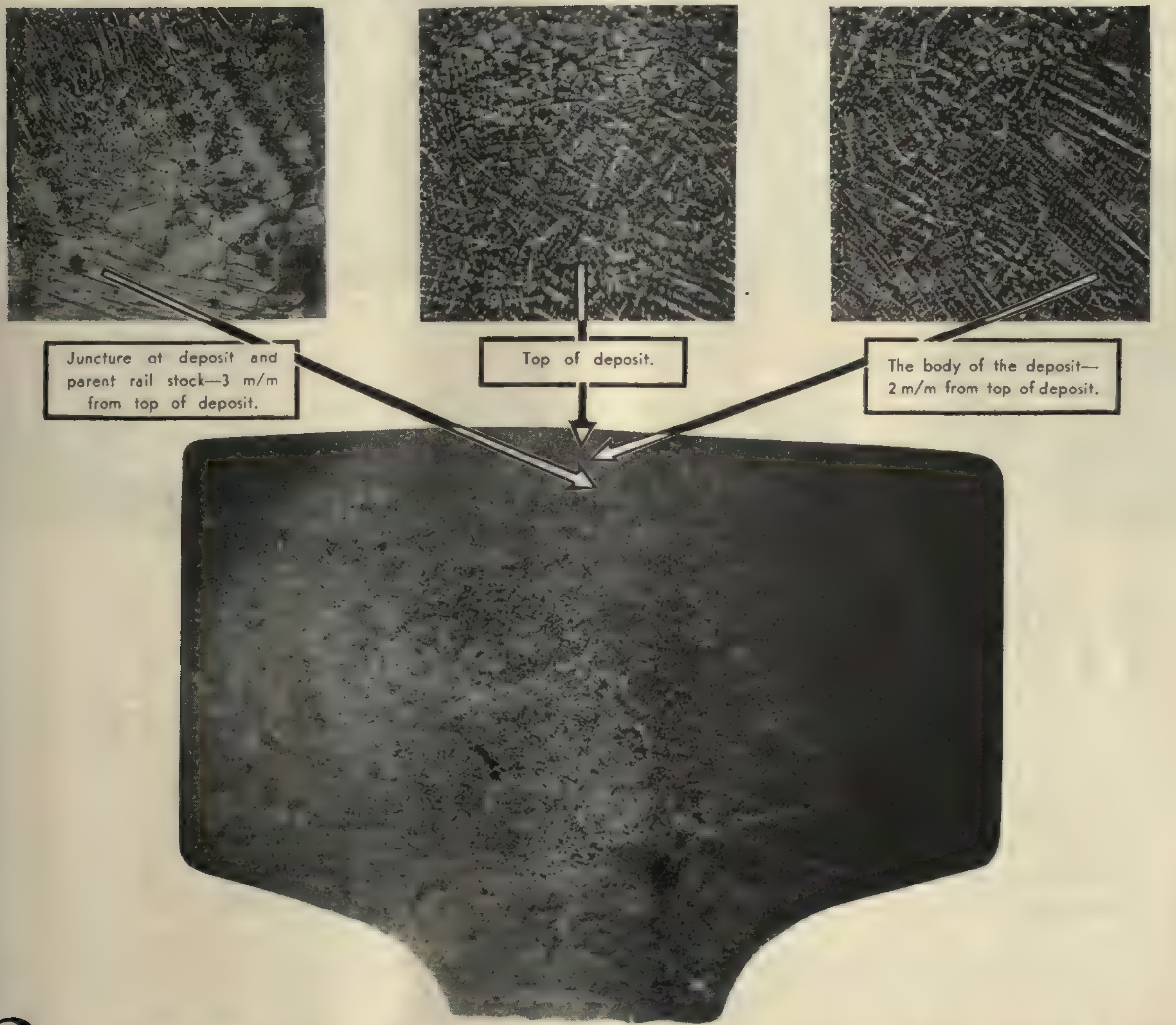
The Chart above tells the Lower Cost of Lubrication per miles . . . .

The charts tell the complete story; briefly Tulc showed these important, advantages to an outstanding extent:

1. Tulc breaks in bearings at 5° to 20° lower temperature occasioning no "break-in" difficulties.
2. Tulc cost less per car on original packing.
3. Tulc required no "repack" or renewal against a large repacking expense for Brand "A" lubricant.
4. Tulc ran 4,105 and 7,516 miles more without requiring additional oil—and was good for another month and more.
5. Tulc lubricated cars required less K. W. H. power per car mile.

The UNIVERSAL LUBRICATING CO.
CLEVELAND . . . . OHIO

STOODY MANGANESE
Welding Rod Deposit
MAGNIFIED 100 TIMES


Juncture at deposit and parent rail stock—3 m/m from top of deposit.
Top of deposit.
The body of the deposit—2 m/m from top of deposit.

Proves that Just any Manganese Rod *won't do*

When this manganese rail section, which had been built up with STOODY MANGANESE WELDING ROD, was examined under the microscope, it proved, as other examinations have, that the deposit from STOODY MANGANESE WELDING ROD is actually better than the manganese steel to which it is applied.

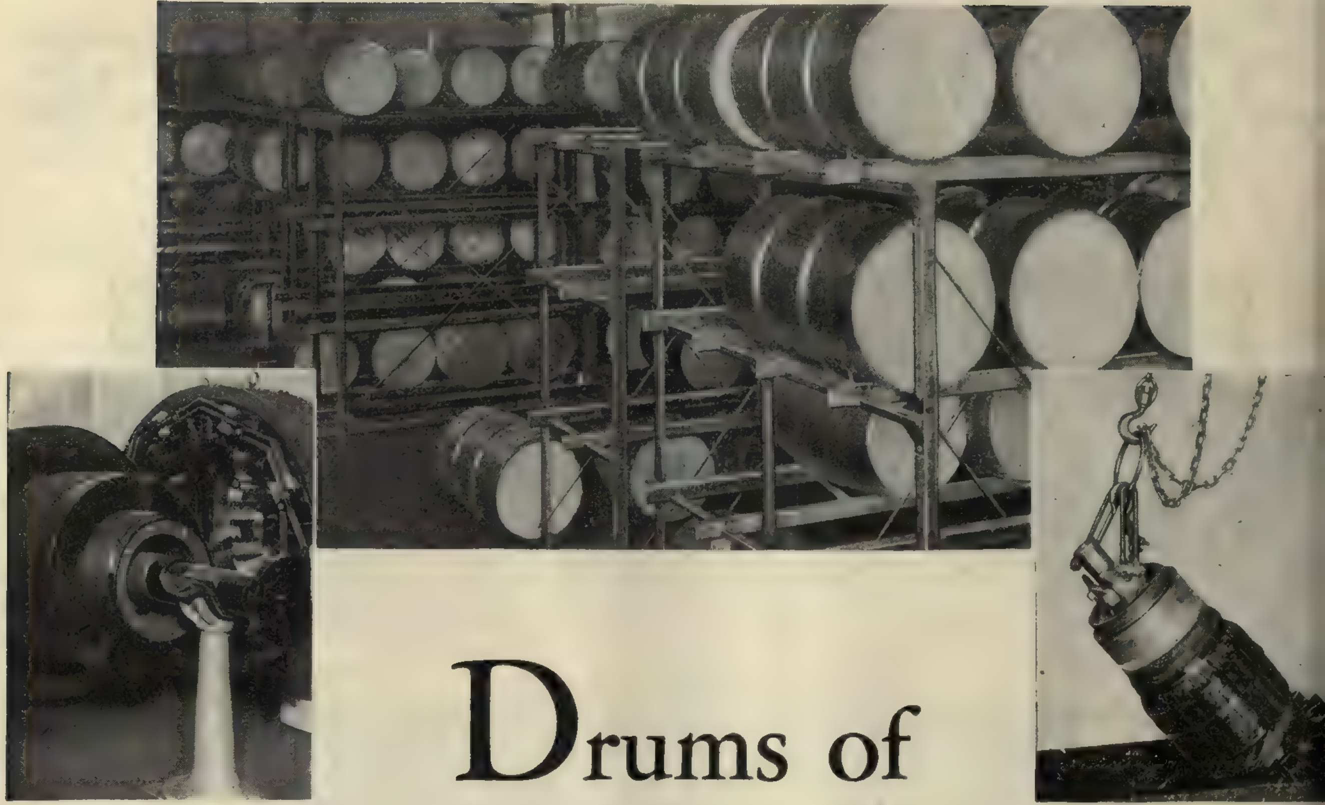
IF YOU HAVEN'T USED STOODY MANGANESE WELDING ROD WRITE US AND A SAMPLE WILL BE YOURS FOR THE ASKING. ALL YOU NEED DO IS MENTION THE APPLICATION AND THE METHOD OF APPLYING.

STOODY COMPANY

Manufacturers of

Welding Rod ◆ Alloy Steels ◆ Equipment

WHITTIER, CALIFORNIA



Drums of

G-E PROTECTION *for* YOUR EQUIPMENT

Out of its vast store of experience in laboratory, factory and field, General Electric offers you G-E Insulating Varnishes . . . the best varnishes that tremendous facilities and skilled workers can produce.

These are the varnishes that protect General Electric equipment. You can use them to protect yours.

There's a G-E Varnish for *every purpose.* Black varnishes, highest in dielectric strength, flexibility and moisture resistance . . . clear yellow, offering greatest resistance to abrasion . . . varnishes for fast or slow air drying or baking. *Whatever* varnish you need, General Electric can supply it.

G-E Varnishes give you *extraordinary quality* at *ordinary prices.* See your nearest General Electric Merchandise Distributor. Delivery is immediate. Or write Section xxx, Merchandise Department, General Electric Company, Bridgeport, Connecticut.

G-E INSULATING MATERIALS *for every purpose*

- Varnishes, Oils, Shellacs, Paints
- Filling and Sealing Compounds
- Varnished Cloths and Tapes
- Insulating Papers
- Core Solder and Fluxes
- Cords and Twines

GENERAL ELECTRIC

INSULATING MATERIALS

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONNECTIC

Double-Dipped Hot Galvanized!

GENERAL ELECTRIC

POLE LINE HARDWARE

WESTERN UNION PINS
DOUBLE-DIPPED
HOT-GALVANIZED

IN railroad service "double-dipped hot galvanized" is a phrase that means something—especially when applied to such hardware as Western Union Pins. It means *longer life* for them.

That's why you can count on longer service and less trouble from lines equipped with General Electric Pole Line Hardware and Construction Specialties.

Every metal part is *double*-dipped hot galvanized . . . on carefully cleaned surfaces. No impurities are left to flake off the zinc.

General Electric's reputation is behind every item of the complete line—braces, pole steps, washers, wood cob pins, anchor rods; all the pole line hardware and construction specialties you need.

Write for the New Catalog

Section xxx, Merchandise Dept.
General Electric Co., Bridgeport, Conn.

Please send me the new G-E Pole Line Hardware and Construction Specialties Catalog.

Name ....

Address ....

GENERAL ELECTRIC

POLE LINE HARDWARE

MRCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONNECTICUT

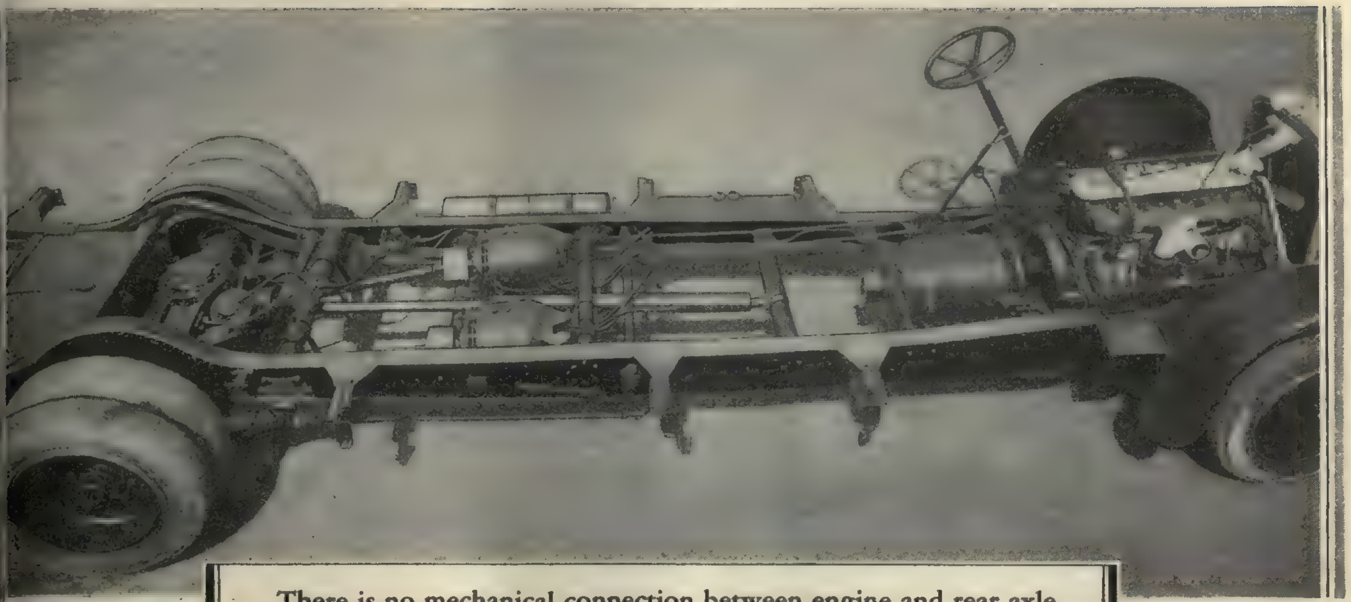
GAS-ELECTRIC DRIV
WINS ITS WAY INT
BALTIMOR

BALTIMORE needed twelve new buses to improve service on a city route characterized by heavy traffic and handicapped at one point by a grade of nine per cent. The selection of G-E equipped gas-electric buses was determined by the report of an impartial committee, under the direction of the United Railway and Electric Company of Baltimore. This committee made a thorough investigation of every large bus system in the United States. Routes were compared; economies were analyzed. The final report proved beyond doubt that gas-electric drive was the only satisfactory means for the one-man operation of high-powered, 68-passenger, double-deck buses. This committee's report is substantiated by the fact that 225 double-deck (one-man) buses with gas-electric drive have been operated for five years in Philadelphia, and the report for the 5th year of their operation shows 92,500 miles per pull-in per electrical failure; this means 92,500 miles per pull-in per "transmission" failure, because gas-electric drive eliminates clutch, transmission, and differential.

Join us in the General Electric program, broadcast every Saturday evening on a nation-wide N.B.C. Network

GENERA

GENERAL ELECTRIC COMPANY, SCHENECTADY, N.



There is no mechanical connection between engine and rear axle

Aside from the ultimate economy of gas-electric drive, there are the simplicity and smoothness of control that save the driver's energy and create good will. Gas-electric drive enables the operator to exercise every possible precaution for the safety of passengers and traffic. We invite you to inquire further into the advantages of General Electric equipment.

lic Service Coördinated Transport, of Newark, N. J.,
tes 1150 buses equipped with G-E gas-electric drive.
a recent purchase of 180 additional equipments,
Company, which operates America's largest bus system,
oon have in service a total of 1330 G-E equipped gas-
ic buses.

Under Mitten Management are 417 G-E equipped gas-electric buses in Philadelphia. Of this total, more than 200 have been in operation since 1925 and, although each of these older buses has traveled more than 150,000 miles, they are all operating just as economically to-day as the day they were placed in service. From all indications, these buses will last much longer than the 10-year life estimated at the time of their purchase.

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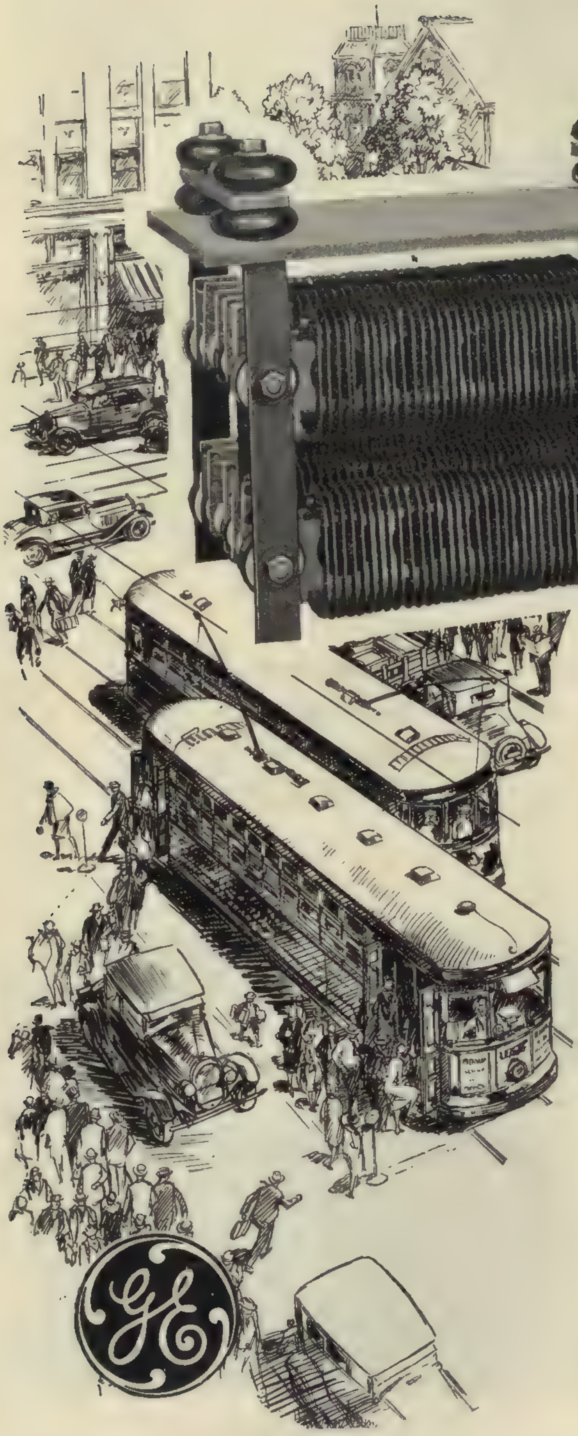
ELECTRIC

ALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

This Resistor CHALLENGES SEVERE SERVICE



You can decrease your maintenance and improve your service by taking advantage of the improvements which General Electric is constantly making in railway equipment.

* * *

NO matter how severe the service con
ditions, the EW resistor meets ther
with an ample margin of strength.

Exposure to the elements cannot affect i
because the units are made of a nonco
rodible flexible alloy of high tensile strengtl
Wound on edge, these units withstan
vibration.

The resistor has a practically constant r
sistance regardless of temperature. It is
constructed that it can easily be applied
replacement of old resistors to reduc
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Consult your nearby G-E Sales office r
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JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

330-1

GENERAL ELECTRI

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITI

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

John A. Miller, Jr., Managing Editor

Volume 74 New York, July, 1930 Number 8

The Industry Prepares to Carry Through

OUT of the 49th Annual Convention of the American Electric Railway Association recently held in San Francisco there emerged a very definite feeling that the path of progress for the local transportation industry lies in the direction of scientific study of its problems. At previous conventions there has been an enthusiastic acceptance of the idea of modernization. But progress has been comparatively slow in putting this idea into practice. Though the need for modernization was recognized, uncertainty existed concerning the best way to go about it. No quick and easy solution of the problem was evolved at this year's meeting. Indeed, it was generally recognized that there can be no quick and easy solution. Advances must be made step by step, and a quiet determination to knuckle down and study the situation until satisfactory solutions are found was evident on every hand.

Had the 49th Annual Convention accomplished nothing else than the crystallization of this sentiment, it would go down in history as having been a real success. But it did more. It brought together more closely than ever the electric railway men of the East and the West and the great central area of this country. Though the number of delegates attending the meeting at San Francisco was somewhat smaller than in other recent years, their geographical distribution was more even. A surprisingly large delgation was on hand from the East and also from the Central West. For many it required the expenditure of considerable time and effort to attend the San Francisco meeting, but all felt amply repaid. The attendance of Pacific Coast electric railway men was naturally much larger than when conventions have been held in the East. It is noteworthy, indeed that the total registration was substantially larger this year than at the last previous convention when there were no exhibits. That the 1930 convention should have been so well attended in a year of business uncertainty is an indication of the sincere appreciation which electric railway men have of the value of these annual gatherings.

Path of Progress Outlined by Executives

SELDOM has such a wealth of valuable material been assembled in a convention program as was presented before the American Association at San Francisco. The addresses were well delivered and gave evidence of careful preparation. Beginning with statements of the difficulties confronting the industry by President Shoup and Managing Director Gordon, the speakers discussed ably the various phases of the theme.

Of particular interest were those speakers who saw possibilities of immediate improvement in conditions without sitting idly by and waiting for someone to present a completed program. There is plenty that can be done at once, so that both public relations and physical plant can be improved without the expenditure of large sums of money. The remarks of J. E. Curtis, chairman of the Nebraska Railroad Commission, indicate that regulating bodies in general are willing to go more than half way in working out a program of co-operative effort involving the companies, their employees, and the communities they serve.

Naturally much interest centered in the plan proposed by the President's Conference Committee, which was explained in some detail by Dr. Conway. Undoubtedly this is one of the most important steps ever taken by the association, and its presentation was one of the high spots of the convention.

Good opportunity was afforded at the general luncheon conference held on Thursday, for a summation of the three sessions of the American association. Without a set program, it was possible to obtain a number of viewpoints on the effectiveness of the sessions. It was apparent that executives are prepared to carry through the program outlined by the association. Particularly significant were the confidence shown in the proposed car improvement plan and the general indorsement of it.

Optimism Is in Order

EACH year the electric railway industry is presented with records of accomplishments which challenge the most pronounced skeptics. These records are indicative of progress. Noteworthy improvements in operating conditions and better financial returns are being obtained on small as well as on large properties, and under conditions common to many sections of the country. An active incentive for the presentation of these accomplishments has been the Charles A. Coffin Foundation Award. For the past eight years this award has recognized and rewarded that electric railway which, in the eyes of the judges, has most definitely solved its own problems and contributed valuable guidance for other companies.

This year the award was made to the Youngstown Municipal Railway for its noteworthy achievement in modernizing its service, increasing its earnings and gaining the good will of the public. The record of this company is the more creditable in that it represents continued progress. Only four years ago the Coffin Award was won by the Pennsylvania-Ohio Electric Company, of which organization the Youngstown Municipal Railway is a part.

Among the outstanding accomplishments recorded in this year's presentations are the securing of new and satisfactory franchises which have relieved the companies of many burdens and which will permit operation at a profit; modernization of equipment and plant; efficient co-ordination of street cars and buses; improving standards of construction, operation and maintenance; extension of chartered service and analytical accident prevention activity. These are not temporary measures applied to save or make money in an emergency. They are permanent and of such a nature as to assure further results.

To ignore the fact that the electric railways have traveled a hard and rough road during the past two decades would be futile. Cost of operation has increased materially while fares are practically the same. Many companies are burdened with obsolete franchises, with obligations never contemplated at the time of their making. New capital is hard to find because of an ignorance on the part of the public as to the efficiency and usefulness of the street car. But these obstacles are not insurmountable. Each year the Coffin Award contest shows conclusively that those companies which bend their efforts to the education of the public through careful merchandising and co-operation with local officials are solving these problems successfully.

Car Improvement Receives New Impetus

FOR several years past it has been realized that the key to the problem of the electric railways lies in the design of the car. While there has been general agreement concerning the need for rolling stock modernization, the progress actually made has been comparatively slow. Experiments with various innovations have been made by numerous companies but there has been little co-ordination of effort. Individual railways have insisted on the inclusion of special features in the design of their cars and have refused to incorporate ideas that have been developed on other properties. This insistence upon special design has resulted in keeping up the cost of rolling stock. Improvements in design have not been widely adopted. In fact, the electric car has practically stood still while its chief competitor, the automobile, has become better and cheaper.

To correct these conditions, a definite program has now been undertaken under the auspices of the Presidents' Conference Committee. Investigation convinced the members of this committee that sufficient authoritative information was not available as to the essential features which should be included in the design of the modern electric rail car. As the first step in its program, therefore, the committee has selected C. F. Hirshfeld, research engineer of the Detroit Edison Company, to make a thorough analysis of the needs of the situation and to develop plans for improving design.

It is not the intention of the committee to develop a standard car. Rather it is the intention to try out every worthy idea that is suggested in such a way that duplication of effort among the various electric railways will be minimized, impractical features of design will be eliminated and the best ideas will be promulgated for the benefit of the industry. In this work the committee will have the backing of railways representing more than 60 per cent of the potential car-buying power of the industry and will have also the co-operation of the car builders.

Undoubtedly this is one of the most promising proposals put forward in many years. As a result of this scientific research, it may confidently be expected that design of the electric rail car will be greatly improved. Such an undertaking, however, will require several years for its execution. Meanwhile the industry cannot afford to sit back and wait for the evolution of a perfect car. Already the railways have suffered heavily through the continued operation of obsolete rolling stock. Every effort must be made to replace this obsolete equipment as quickly as possible. Treatment of a critical ailment cannot be deferred in hopes of a more effective remedy being discovered at a future date. The fruits of research will be enjoyed in due time. For the present we must endeavor to take full advantage of the best designs now available.

The Engineer's Responsibility Is Paramount

ORGANIZED research along several lines, which is projected or already under way by the American Electric Railway Association and its affiliated bodies, has placed a large responsibility on the engineer in the transportation field. Plans for the improvement and standardization of cars, making market surveys in all branches of the industry and obtaining greater economy and efficiency of operation, all call for the highest skill the engineer can furnish.

As to the meetings of the Engineering Association, they showed a remarkable grasp of the problems that have attracted the attention of operating men for a number of years. The various committees made reports that showed a close attention to the subjects and skill in arriving at the proper solution. New equipment and new designs were studied. Latest developments in cars, buses and trolley buses were discussed and their particular advantages and disadvantages analyzed from the engineering viewpoint. Examination of the reports of the sessions and the papers which were presented discloses the breadth of scope coming within the purview of the engineer.

Looking ahead and planning the activities of the engineer for the immediate future, the general convention, as well as that of the Engineering Association, recognized the necessity for progress in five major directions. These were the absolute need for specialized merchandising of the service rendered, improved equipment and facilities, the continued development of design for greater comfort and convenience, the attainment of higher speeds and the acquisition of equitable franchises and rates of fare. The engineer must play his part in the working out of these problems. That is indisputable. The meeting in San Francisco emphasized this fact, and the engineers who were present could not but realize the responsibility which they must assume, not for their own property alone, but for the industry.

T. & T. Urges More Intensive Merchandising

PROGRESSIVE thinking on major topics of the day marked the work of the Transportation and Traffic Association during the past year. Reflected in the committee reports prepared and the discussion of them, at the San Francisco meetings, this thinking will be recorded as a definite contribution to the advancement of the industry. Since 1908, when the association was formed, it has contributed much through the work of its many committees. The 1929-1930 period brings to a head this previous study and advances many new ideas.

Handling one of the most important subjects, the small-city committee continued its collection of data and information. Its report particularly emphasized the need for intensive merchandising. Better selling of the service is the first step the smaller railways should take, and it is encouraging that more attention is being paid to this fundamental requirement.

It is significant that another committee, that on the passenger, should strike down to the foundation of merchandising in its report. Feeling that a better knowledge of the desires of the public for transportation is essential, the committee selected a trained man to establish a scientific method of making market analyses. Intended to determine whether more rides may be sold to the present users and whether non-users can be induced to ride, these surveys will form a standard basis for adjusting service and building up revenue.

Although no direct reference was made to merchandising in the report of the committee on the transportation employee its suggestions for selecting and training men properly will assist in developing salesman. Analyzing the job of each employee is bound to show whether his relations with the public, his appearance and manner, and his ability to do his work will qualify him as a salesman.

Movement of the vehicle, operating economics and equipment were the other subject studies. An analysis of the effect of the automobile on riding is included in the report on the first-mentioned topic. It also gives valuable suggestions on making studies of parking and traffic control. The operating economics report lists many practices generally applicable which have increased revenues or decreased costs. Convincing figures on the beneficial effect of new or rehabilitated cars on revenue and expenses were presented by the equipment committee. Study of the statistics of 40 companies having new cars, and 41 companies operating old equipment, together with a detailed study of two selected cases, led to the one conclusion—that modern cars appreciably increase passenger revenue.

An Opportunity for Utilizing the Art of the Drama

KEEN interest is felt by all electric railway men in their industry and the discussion of its problems, but it is too much to expect that this interest should be so strong as to render them oblivious to the manner in which the subject under discussion is presented. A bright, lively presentation catches and holds their attention whereas a dull tedious presentation allows their interest to slip away. At electric railway conventions, too much reliance is sometimes placed on the importance of the subject as a means of holding the interest of the delegates, and not enough thought given to making the presentation effective. As a result, vital matters frequently do not receive the attention they deserve. It is a great pity that this condition should exist. The opportunity afforded by the annual A.E.R.A. convention for group consideration of transportation problems by executives from all over the country comes but once a year and it is extremely desirable that the fullest possible use be made of this opportunity.

To find a remedy for this situation is not easy. The busy railway executive has no time to study oratory before going to a convention to make an address. It would scarcely be diplomatic for the program committee to offer detailed suggestions in advance to the speaker. One possible solution of the problem might be for the committee to secure the advice of an expert on program arrangement. A man of this kind could render valuable service not only in suggesting how to treat individual subjects most effectively, but also in suggesting how best to arrange the various topics to be considered at each session and how much time should be allotted to each to avoid wearying the delegates. He might also be able to suggest a better balance between formal addresses, committee reports and informal discussion. In short, he would apply the art of the drama to making the program attractive.

It is no criticism of those responsible for the electric railway convention programs that something of this kind is needed. The members of the program committee are transportation men, not dramatists. But experts on the principles of program arrangement are available and could well be utilized. This would in no way detract from the impressiveness of the sessions. Even the most important subject gains emphasis from an interesting and effective presentation. A convention program should be more than a mere collection of topics which are believed to be timely and interesting. It should be put together with the same care that is exercised in the arrangement of a theatrical program in which each act is considered in its relation to the other acts.

Co-ordination Ahead for Chicago

VOTERS at Chicago on July 1, by an overwhelming vote approved the new franchise ordinance calling for co-ordination of all local transportation agencies. That augurs well for the future. Of course, the measure is not perfect. No human document ever is, but it is undoubtedly the best plan that has been proposed.

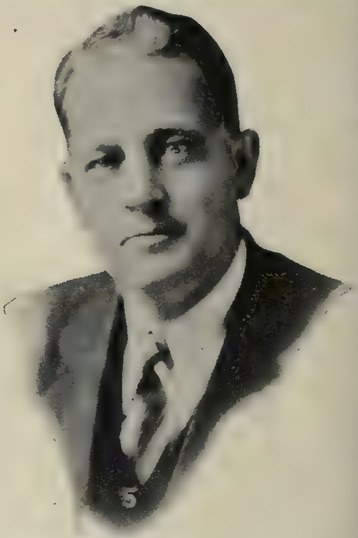
The old franchises were unsatisfactory in many ways. The idea behind them was to tie the companies up tight. And that they did. It is surprising that under them the companies did as well by the people of Chicago as they did. So far as it was possible to do so under the restrictive grants in force progressive managements of both the surface lines and the elevated have given the public a taste of what could be expected under a grant fair alike to the companies and the city. They kept faith in the larger sense of their civic responsibility. And they have been rewarded and the city has been rewarded by acceptance of an ordinance probably without parallel in the annals of franchise grants of the kind.

It will take some time to work out the financial details, but the stage is all set. Financing is a matter of technique. While this is also true with respect to the plan for the expenditure of $60,000,000 within the next three years and $200,000,000 within ten years, the work of aligning the properties physically can be begun at once and may be expected to proceed promptly.

In the form in which the grant was finally adopted and now passed the ordinance represents many years of effort to find a solution to the question and many months of intensive work by various officials and civic groups. Under it the new co-ordinated company, the Chicago Local Transportation Company, will be enabled to give the millions of people patronizing its lines efficient and satisfactory service. Transportation in Chicago may now be expected promptly to get into step with the march of progress of the city's other utilities. That has been a hope long deferred. Now it should soon be realized. Both the companies and the city are to be congratulated on the outcome.

Newly-Elected Presidents

of the AMERICAN and AFFILIATED ASSOCIATIONS



1. **J. H. HANNA,** elected president of the American Electric Railway Association, is president of the Capital Traction Company, Washington, D. C., with which and its predecessors he has been connected since 1894. He knows that property and the personnel intimately, and he knows the transportation industry. He is the first man ever to have been president of both the association and its affiliated body of engineers. Long has he been active and prominent in association work. He is well known and well liked, locally and nationally. He is an engineer with vision, as his administration of the Washington property testifies. Mr. Hanna was graduated from Princeton in 1892 as a civil engineer.

2. **L. D. BALE,** elected president of the American Electric Railway Engineering Association, is superintendent of the power department of the Cleveland Railway. His greatest contribution to the industry is the work that he has done in developing the automatic substation. He has seen service with the Louisville Railway, the St. Louis Transit Company and its successor, the United Railway, and with the Cleveland Railway, with which he became associated in 1908 and for which, starting in 1911, he revamped the entire power supply system. He has been unusually active in association affairs. He studied at Rose Polytechnic Institute, but not until after he had served as an apprentice with the Louisville Railway.

3. **PAUL E. WILSON,** elected president of the American Electric Railway Transportation and Traffic Association, has been connected with the Cleveland Railway since 1902, but not continuously. His first work was as office boy. Again he was with the company from 1905 to 1908, in the operating department. Then he served the Cleveland *Leader* and the Cleveland *Press* as reporter, studying law meanwhile at Western Reserve University. His return to the railway dates from 1910. His advance to the post of vice-president and secretary was rapid.

4. **C. E. REDFERN,** elected president of the American Electric Railway Claims Association, is claim agent of the United Electric Railways, Providence, R. I. He entered the service of the predecessor of that company in 1900 direct from business school, transferred to the claims department in 1902, and was made claim agent in 1907. His chief interest is in safety work because of its direct bearing on the affairs of his company and its humanitarian aspects. He is on the executive committee of the National Safety Council and is a member of the Governor's committee in Rhode Island on street and highway safety. Mr. Redfern was admitted to the bar in 1921.

5. **C. E. YOST,** elected president of the American Electric Railway Accountants' Association, is treasurer of the Delaware Electric Power Company, Wilmington, Del. This company is the successor to the Wilmington & Philadelphia Traction Company with ramifications more extensive than the company's title would appear to imply. In the work of the company, Mr. Yost has played a very important part.

Co-operation Is Essential
To Meet
1930's Challenge to Transportation

In his presidential address before the American Electric Railway Association Mr. Shoup points out the problems that confront the industry and outlines a means of solution

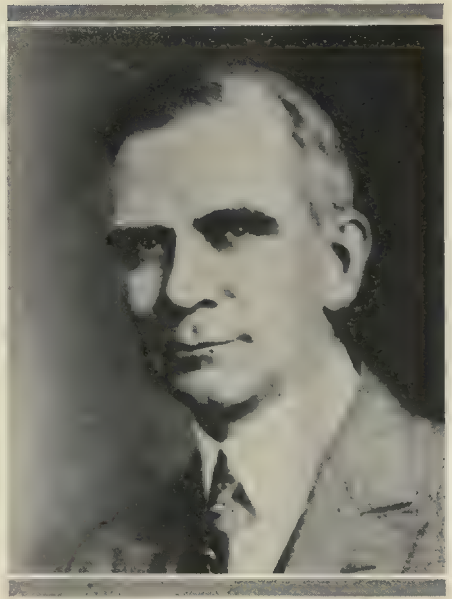
By PAUL SHOUP

President American Electric Railway Association, Chairman of the Board Pacific Electric Railway

DURING the fifteen years since the American Electric Railway Association held its annual convention west of the Rockies, many changes have occurred in the whole transportation structure of the nation, the local transportation industry in particular. It has been forced to contend with shifting economic, political and social forces that have put to a most severe test the industry which you represent, and in which there is invested some five and one-half billions of dollars; almost a fifth of that invested in steam railroads.

Out of this battle for existence there is coming a more virile industry. Useless branches of the transportation tree have been swept away by the storm of conflict or removed in the interest of more efficient service. The trunk remains permanently rooted in community soil.

You may well take pride in the recent record of the industry. We are passing through a general severe industrial depression. The output of some of our major industries has been temporarily greatly curtailed. Our local transportation industry has shown only moderate effects from these depressing causes. A non-essential or fading industry does not establish a record like that in times of depression.



Paul Shoup

It has been increasingly apparent for twenty years that transit and traffic conditions in American cities should receive attention. Transportation facilities in the majority of the larger cities of the country have been permitted to fall far behind the standards for other elements in modern urban life. Measured in terms of convenience, comfort and safety, the conditions to which people in most cities are subjected when they attempt to move about, reflect little credit upon American progress. Inconvenience, crowding and dangers encountered in riding, driving or walking in congested traffic areas have come to be accepted as almost inevitable. That should not be so.

The remedy for these conditions lies in the hands of transportation men and the public working co-operatively. It is part of our job to show the public what the remedy is, and how we can join hands and apply it. The job is worth doing, and worth doing well. Unless I am greatly mistaken, eventually it will fully reward the men who do it.

Companies providing public transportation service in cities are seriously handicapped by the lack of public understanding of the problems involved and consequent lack of public co-operation. Measures for the improvement of the service naturally raise many public issues that are complicated, and to some extent of a technical nature. Any sound program of improvement must put the needs of the community as a whole above the interests of a particular section or group, but partisan politics, prejudice, and, finally, selfish interests of individuals or groups, tend to obstruct progress. There is need, therefore, for a better understanding by each community as to transportation policy that will be most beneficial to it as a whole.

Back of our so-called street traffic problems lies the major problem of transportation. Traffic and transportation are closely related in their activities. It is not my part to discuss a solution; I will mention but a few of the problems that are up for solution. These concern not only our companies engaged in this public service, but the cities and communities thus served.

Here is a vital and necessary utility service which carries seventy-five per cent of all the people who move daily in and out of the central areas of large cities. The industry ranks about eighth in the amount of invested capital in the United States. But while the difficulties of other industries attract attention as national business problems, the long protracted struggle of the local transportation industry to maintain a vital public service while handicapped by serious economic and political obstacles attracts far less public attention than is warranted by its importance.

This situation is the more to be lamented because of the fact that relief can be given at no expense at all to the public. With such relief will come a vast improvement in personal comfort, in convenience, in maintenance of home and business values, and creation of new values for all the people of the communities served.

It is absurd, as was shown by the recent report of a State Taxation Committee of the State of California, that the electric railway industry—the least remunerative of industries in this state—should be bearing the highest tax relatively compared with all other public service corporations. It is absurd that these companies should be compelled to continue the paving and maintenance of sections of streets and highways—in many instances the major part—when it is the tremendous traffic of the last few years of motor vehicles used in private service that is wearing them out.

The uncertain policies of the cities with respect to franchises, whereby the owners of invested capital do not know when it will disappear absolutely, and the thoughtless use of police power that puts added operating burdens upon the companies in so many localities, can be so easily and simply removed, in so far as the mechanics of the problem are concerned, that it seems almost unthinkable that enlightened policies have not been established, since they are so essential to the life and growth of the cities.

Experience has indicated that the construction of rapid transit structures, either subway or elevated, is not a suitable field for the investment of private capital. Due to high fixed charges, the riders cannot furnish revenues sufficient to carry the fixed charges, and maintain these structures. The question then arises, if the necessity takes on a conclusive aspect, as to who is benefited, and who should help carry the charges that are not properly allocable to the riders, because of the greater convenience and more rapid transit given them in their transportation.

It is believed by some students of this question that a clearer understanding is needed of the distribution of benefits from transit improvements among the several groups in a city which are affected thereby; namely, the community as a whole, property directly enhanced by the location of transit lines, and the riders who use the service. Though the property which receives direct benefits from the location of transit routes plays a very active part in dictating the location of lines and even of stations, it has so far failed to carry its proper share of the construction cost burden. In this fact seems to lie the difficulty both financial and political of providing adequate rapid transit.

Few companies in the United States are able to pay a satisfactory return to their investors, even though the average rate of fare has steadily risen during the past decade. In consequence, the financial and physical status of electric railways in many cities is in serious jeopardy. As a result, the communities are faced with large expenditures for increased street capacity, because the public very naturally prefers to use its automobiles as a substitute for public transportation when the latter is not permitted, through either political, physical or economic handicaps, to develop the class of service to which the public feels itself entitled.

Nor is the outlook for other public agencies of urban transportation much better without adequate public co-operation than is that for street cars. The bus, though rapidly finding its level as an adjunct to other transportation agencies, offers no permanent solution of present difficulties. It merely furnishes another tool of transportation that fits in between the individual automobile and the street car, and is particularly adapted for furnishing certain forms of service. In general, it has been clearly established that the wholesale replacement of street cars with buses, though it would involve the wiping out of an investment amounting to several billions of dollars in present street railway plant and roadbed, would complicate rather than simplify the urban transportation and traffic problem. One fact is definitely established: in any city, buses and street cars need to be operated in harmony and under one management.

Next, we come to the individual public vehicle—the taxicab. Here again we find an unsettled and unsound financial condition. As a matter of fact, the situation is such that it is unattractive to responsible capital and the growth of unregulated and destructive competition has resulted in widespread evils, and in some large cities is a major factor contributing to the traffic congestion problem.

Thus we have in every form of public transportation service in cities, in rapid transit, street railways, buses and taxicabs, the same general situation—unstable and unsatisfactory present conditions which threaten to become worse. At the same time there is no generally accepted policy under which these facilities may be expected to grow and develop.

The conditions to which pedestrians are subjected in present day traffic are a serious reflection upon our ability to provide for the intelligent and safe use of the machines which we ourselves have created. All of this is attributable to destructive policies, inadequate planning, and improper regulation to meet changing conditions. There seems to be great need for more general recognition of the relation between transportation and traffic in order that improvement programs may be developed on a basis broad enough to insure substantial relief and to provide for future requirements.

The situation has been summarized for me in this sentence: Cities cannot get along without local public transportation, and local public transportation cannot get along without the cities. But the cities and communities need to realize their obligations in this connection, because of their own interest, irrespective of the contractual relations that were entered into under different conditions when those companies first took on the obligation of carrying the public locally. The congestion in the business areas reaching points of stagnation, as I have said, makes more essential than ever before a complete co-operation involving the city governments, the public organizations seeking to solve the problems, the automobile associations, the transportation companies, and the individuals. These last named are very changeable, having, as each one of us knows, varying viewpoints according to whether they are on foot, riding in street cars, taxicabs, or in automobiles, or merely the immobile statues of patience waiting for these moving activities to get out of the way.

Meeting the Problems of Today in the Transportation Field

American Association sessions discuss vital subjects affecting the industry from many angles

THIS year three sessions of the American Electric Railway Association were held at San Francisco, on June 23, 24 and 25. The general theme of the convention was "1930's Challenge to Transportation Men." Each day the subject was treated from a different angle. On Thursday there was no formal meeting, but a general luncheon conference was held at the Fairmont Hotel, at which those present informally summed up the convention.

Monday's session, which marked the opening of the convention, began with the presentation by the chairman, President Paul Shoup, of Hon. A. J. Rossi, acting Mayor of San Francisco, who welcomed the delegates in most cordial fashion.

In his presidential address, Mr. Shoup sketched the development of the local transportation industry, pointing out the essentiality of the service rendered and the impossibility of building up great cities without adequate transportation.

Following Mr. Shoup's address, D. W. Pontius, president of the Pacific Electric Railway, Los Angeles, delivered an address giving in some detail the things that can be done to improve interurban operation and revenues.

"Making the Most of Existing Street Railway Properties" was the subject of an address by Samuel Kahn, president Market Street Railway, San Francisco. The problem, he said, is the same as it was in the horse car days. The desirable features of service include speed, frequency and comfort. The standards by which the public measures the service, however, have changed and it has been necessary to revamp the traction systems time after time. He believes it is necessary to cater to the needs of the patrons and to their whims as well. Fast schedules without layover, he thinks, are essential if a company would succeed.

Abstracts of the addresses appear elsewhere in this issue.

The Industry's Plans to Help

TUESDAY morning's session of the American Association opened with the report of Managing Director Charles Gordon. He emphasized that in order to provide a satisfactory solution of the street railway problem public understanding is necessary. In order to obtain results it is essential that greater interest be taken in the work of the association and that co-operation be obtained from representative business men in the various cities of the country.

Announcement of the Anthony N. Brady Memorial Safety Awards was made by Mr. Gordon. In his remarks he stated that the record made by electric railways is a bright spot in a generally depressing traffic situation. The electric railways have had a comparatively small number of accidents in comparison with other vehicles operating on the highways; in particular, fatalities are exceedingly low.

The award of the gold medal for Class A roads, those operating more than 5,000,000 car-miles per year, was made to the Duluth Street Railway, with honorable mention to the Ottawa Electric Railway.

The silver medal for those roads operating between 1,000,000 and 5,000,000 car-miles annually was awarded to the Colorado Springs & Interurban Railway, with honorable mention to the Calgary Municipal Railway, Calgary, Alberta.

The bronze medal for those roads operating less than 1,000,000 car-miles per year was awarded to the Lethbridge Municipal Railway, with honorable mention to Montana Power Company, Missoula division.

Nominations were announced by Frank R. Coates in the absence of James P. Barnes, chairman of the committee on nominations. The nominees were elected unanimously as follows:

President—J. H. Hanna, president Capital Traction Company, Washington, D. C.

First Vice-President—G. A. Richardson, vice-president and general maanger Chicago Surface Lines, Chicago, Ill.

Second Vice-President—J. H. Alexander, president Cleveland Railway, Cleveland, Ohio.

Third Vice-President—W. A. Draper, president Cincinnati Street Railway, Cincinnati, Ohio.

Fourth Vice-President—W. E. Wood, vice-president Engineers Public Service Company, New York, N. Y.

Treasurer—Barron Collier, president Barron G. Collier, Inc., New York, N. Y.

Members-at-Large of Executive Committee:

Operating Members (Three-year term)—Dr. Thomas Conway, Jr., president Cincinnati & Lake Erie Railroad, Philadelphia, Pa.; G. J. Kuhrts, president Los Angeles Railway, Los Angeles, Cal.

Manufacturer Members (Three-year term)—E. P. Waller, manager transportation department General Electric Company, Schenectady, N. Y.; C. R. Ellicott, vice-president Westinghouse Traction Brake Company, New York, N. Y.; A. A. Hale, vice-president Griffin Wheel Company, Chicago, Ill.

Myles B. Lambert was elected to fill the unexpired term of E. D. Kilburn, resigned.

E. J. McIlraith, Chicago Surface Lines, addressed the meeting in the absence of G. A. Richardson, vice-president and general manager of the same company. He outlined briefly the work done by the committee on street traffic economics. Mr. McIlraith believes that use of the streets must be regulated in order to help a city grow in a logical manner.

Decentralization of some businesses, such as grocery stores and drug stores, is desirable, according to Mr. McIlraith. These businesses are more or less local in character and there is no advantage in concentrating them at a few points. Other businesses should be grouped together in order to get the best economy of time of those working in them. He believes that centralizing of many lines of business is increasing and cited New York, Chicago and other cities as proof of this. With this development under way the street railway is not on the way out but is going ahead along with this tendency. In Chicago ten years ago there was a question of whether the streets would be adequate to handle the traffic that was being offered and whether it would not be necessary to distribute business over a much wider area on that account. Today, he said, there is no doubt about it. Changes in traffic regulations and elimination of parking have made it possible to move such an enormously increased number of people in and out of the central district that there is plenty of space for growth in business interests for years to come.

Street railway men must take the leadership in traffic regulation and control in order that it will serve the whole public. Signals of archaic type have been developed and introduced in cities to their great detriment. Mr. McIlraith gave several instances of this, indicating that advanced forms of traffic control are absolutely essential.

Progress in meeting the industry's equipment problem was the topic of an address by Dr. Thomas Conway, Jr. Dr. Conway outlined the work that has been done by the present committee which has been formed to investigate the problem of better design of street cars. He indicated that a new method of approach must be adopted in order that cars may be designed which will better meet the needs of today and can be sold at reasonable cost.

Edward Dana, general manager Boston Elevated Railway, addressed the meeting on the technique and possibilities of conference training for employees, summarizing the work done by the committee on employee training. This committee, he said, believes that the conference method of training is the most important that can be adopted in instructing employees in the technique of their positions. Methods already in use to train men to do their work on the cars efficiently is entirely satisfactory. What is needed is training for salesmanship—selling rides to customers. The most striking feature in the conference method is that it interests the individual worker. Considerable work has been done in the past few years in training foremen through conferences. The experience gained in this is most valuable in formulating plans for a broader type of training that can be adapted to all employees. Experience indicates that what should be taught is customer contact. The first thing necessary in selling car rides is to determine what is a satisfactory ride, and the next necessary thing is to determine what is satisfactory service.

The conferences that have been successful in Boston in carrying out this plan have been quite short, lasting one to 1¼ hours. It has been possible to interest all of the men and to have each one take a part. Mr. Dana outlined in some detail the courses offered to foremen and supervisory officials in Boston. He stated that it is necessary to emphasize the relationship of the employee toward his job and toward the public. It also is necessary to develop in him a feeling of loyalty and desire to give the best service possible. Another need in the training is to develop a technique of customer contact. In this particular the conference method is the only approach that is of value in instructing adults.

Edward Dana **H. G. Taylor**

Who presented addresses before the American Association

Future of Public Control

AT THE Wednesday session of the American Association the *Electric Traction* Speed Trophy was awarded for the year to the Chicago, South Shore & South Bend Railroad. The presentation was made by J. M. Bamberger and the cup was accepted by W. A. Sauer, vice-president of the railway.

Mr. Shannahan reported on the relations of the association with the United States Chamber of Commerce. This, he said, is the only way the American business man has of making his needs known and it is essential that the electric railways be recognized as a vital element in American industry.

Mr. Shannahan then discussed briefly the relationship companies should have with their employees. The man on the platform of the car is our greatest potential asset, he said. Every operator should take advantage of the plans that have been developed by Mr. Dana's committee on employee relations and adapt them to its individual needs. He told in some detail of the change in sentiment of the public in Omaha since he has been associated with the company and where the public relations were previously very unfavorable. The improvement he credited to the work of the trainmen in engaging the support of the riders and the voters in general. This support made it possible to have a new franchise presented and adopted. Later on the same men made it possible to obtain a much-needed increase in fares.

H. G. Taylor, manager public relations, car service division, American Railway Association, addressed the meeting on the advances in transportation and the problems that have been brought with them. He mentioned briefly the great development in air transport during the past five years, and also the development of the motor bus. The bus, he said, has now taken its place alongside the street car, not to replace it nor to compete with it, but as an ally. Economic conditions must be recognized in the determination of rates of fare, according to Mr. Taylor. This contemplates regulating traffic conditions, which are chaotic all over the United States. The sentiment in favor of automobiles as against everything else, he believes, is waning and the street car is coming back into its proper field.

Need of better street cars was emphasized by the speaker. As illustrating his point, he told of the progress made by the steam railroads, which since 1920 have put a large amount of capital into the business and as a result have been able to obtain economies resulting in a great increase in net revenue. The program for improvement of car design which was adopted at this convention he believes is excellent and that it should lead to good results. Old cars, he holds, advertise the business as decadent and should be retired as soon as practical.

Mr. Taylor believes that there should be close co-operation between street railways and public utility commissions. There should be an interchange of information and better understanding of the problems involved. As to the future of the street railway, he is optimistic. He believes that it is an essential industry. However, the idea must be sold to the public that it is superior to any other form of transportation in its field and he believes that this has not yet been done.

An outstanding address was delivered by John E. Curtiss, chairman Nebraska State Railroad Commission, on the subject "Public Responsibility in Regulating a Competitive Industry." Illustrating his remarks with pointed anecdotes, Mr. Curtiss said that competition itself makes a very effective regulation which determines the maximum rates that can be charged and dictates to the managements the need for efficiency and economy.

An address on the subject of taxation was read by M. D. Lack, tax counselor California Taxpayers' Association, Los Angeles.

An address on the subject of "National Relations," giving the results of the work accomplished during the year by the American Association committee on that subject, was read by Ralph Bradley in the absence of C. D. Cass, general counsel American Electric Railway Association.

Following the adoption of report of the committee on resolutions the new officers present were installed. The meeting closed with an ovation to the retiring president, Paul Shoup.

Luncheon Conference Summarizes Situation

As a fitting climax to the convention, a general luncheon conference was held Thursday noon, after the official closing of all other meetings, for the purpose of summarizing the high spots of the convention and analyzing the future prospects of the industry. The chairman was D. W. Pontius, president Pacific Electric Railway.

In opening the comments on the convention, Dr. Thomas Conway, Jr., Cincinnati & Lake Erie Railroad, spoke of the President's Conference plan and its purpose of co-ordinating all developments of the past and future in the perfection of the street car. He cautioned against the expectation of startling results immediately and stated that only through a slow, orderly advance could progress be made. "The success of the efforts," he said, "depends on the co-operation of all electric railways and manufacturers."

Frank Karr, Pacific Electric Railway, gave his impressions of the convention and the principal things derived from the meetings.

Striking the keynote of the convention activities, W. B. Brady, Central Public Service Corporation, voiced optimism in the future of the industry because the problems are being attacked scientifically. He pointed to the new car plan, the recognition of the need for merchandising, the specific efforts in this respect through the introduction of market surveys, and the further studying of what properly may be termed a scientific fare structure.

Samuel Kahn, Market Street Railway, lauded the seriousness with which the problems of transportation were attacked, and cited the convention as the beginning of a new era.

That the association must broaden its scope of activities and include every form of public transportation was the view expressed by Julian M. Bamberger, Bamberger Electric Railroad. "We cannot be satisfied," he said, "with being street railway men. We must become public transportation men." Mr. Bamberger also commented on the lack of symposiums, discussion and attention to the problems of the interurban, and voiced the opinion that some means must be obtained of securing more collective data on specific problems.

Acquainting the public with the industry's problems and burdens is one of the vital needs, according to A. J. Lundberg, Key System Transit Company. Before giving them the facts, however, the railways must put their house in order, he added.

In the opinion of R. O. Crowe, Los Angeles Railway, the biggest thing which the delegates will carry from the convention is a renewed enthusiasm and faith in the industry.

"Find out how to sell your product," was the advice given by O. A. Smith, Pacific Electric Railway. Mr. Smith commended the merchandising activities started during the past year and added that all of the fundamental problems of the industry must be attacked from a merchandising angle.

Attractive service and well trained salesmen are the two biggest needs at the present time, according to A. T. Mercier, Pacific Electric Railway.

"The President's Conference plan and the making of surveys to determine what the public desires," stated Edward Dana, Boston Elevated Railway, "will open up a new effort in accomplishing the plans for modernization which have been under way for some time and which all railways have considered necessary."

J. M. Shannahan, Omaha & Council Bluffs Street Railway, commented on the seriousness with which the delegates engaged in the meetings and praised those responsible for the perfect convention arrangements and the splendid entertainment provided.

Three subjects, all of vital importance, were covered very thoroughly at the meetings, the comfort and convenience of passengers, fares, and speed. "The full discussion of these," stated J. H. Hanna, president of the Capital Traction Company and new president of the association, "will go a long way in attracting riders and making the public desire to use the service."

S. B. Way, Milwaukee Electric Railway & Light Company, commented on the service rendered by the San Francisco systems, and praised the work of the committees in charge of this year's program.

Charles Gordon, managing director of the association, summed up the high points of the convention and added an optimistic note to the closing. The obtaining of the other man's view at a convention of this kind, he pointed out, enables the interpretation of his ideas and the use of these throughout the entire year. Mr. Gordon spoke of the great responsibility, other than that of moving people, of acquainting the public with the problems and learning more about how the people wish to travel.

Guy C. Hecker
General Secretary

Barron Collier
Treasurer

Vice-Presidents and General Officers of the A.E.R.A. *for 1930-1931*

G. A. Richardson
First Vice-President

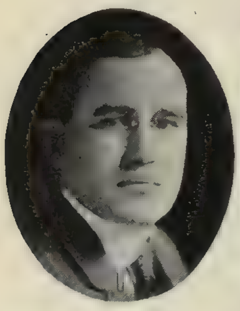
J. H. Alexander
Second Vice-President

W. A. Draper
Third Vice-President

W. E. Wood
Fourth Vice-President

Newly-Elected Members of the Executive Committee

1. E. P. Waller
2. Dr. Thomas Conway, Jr.
3. A. A. Hale
4. C. R. Ellicott
5. G. J. Kuhrts



CO-OPERATIVE EFFORT

Is Essential

By **CHARLES GORDON**
Managing Director
American Electric Railway Association

Charles Gordon

COMPARED with other classes of utility services, local transportation companies are seriously burdened by limited man power and small staffs—particularly at the top. The long period of inadequate earning and unsettled future which we have experienced, has forced the most rigid economy in every department. Consequently, the chief executive of the average company is burdened with a heavy personal load.

There is still another situation which is above all the most discouraging with which the executive of a local transportation company has to deal. This is brought about by destructive tactics of the self-seeking politician who has little sincere interest in the transportation problem beyond the opportunity which it offers to get himself favorable notice in the press as a champion of the people at the expense of a corporation. The railway executive seeking intelligent public consideration of the many problems which he faces in his effort to preserve and rehabilitate a vital service to the public, is still frequently hamstrung and kept on the defensive by this type of political buffoonery.

Nevertheless, the situation with which an individual company contends is in a large measure circumscribed and materially influenced by developments in many other communities. Consequently, the action of each management and each community influences the situation of every other property in the country. Collective study of common problems and the very closest possible co-operation between companies is therefore of paramount importance.

Those of our current problems which lend themselves best to collective action, divide logically into six principal elements. Three of these have to do with the technique and methods within our industry; the other three involve questions of public policy which we can influence only indirectly, and then only in the development of policies and the application of measures intended to serve the best interests of the community as a whole.

Within the first group I place the equipment with which we render service—the general character and performance of the cars which we operate. The importance of this question has been recognized for several years and it has a prominent place on the program of this convention.

Second is the human factor in our business; that is, the attitude and the skill displayed by our employees in direct contact with the public.

It is absolutely essential that we have their full co-operation. But loyalty and the desire to co-operate are not alone sufficient. In addition, modern transportation conditions require a high degree of skill both in the operation of equipment through congested streets and in dealing with the public that boards our cars.

The third factor is the method of charging for our service. First of all, the product itself must be saleable. Next it must be sold by the people with whom the public is willing to do business. Finally, the price must be right. Other factors have an important bearing. Not the least of these is the presence of competition. Where it exists it exerts a strong influence on the making of rates or prices.

Turning now to questions of public policy upon which we can do little more than seek intelligent co-operation, there are again three principal problems which lend themselves to co-operative effort by the industry. There are three outstanding questions—taxation, franchise terms and regulatory policy, and the extent to which the efficiency of public transportation is recognized in seeking relief from street congestion.

All three of these topics—taxation, regulation and the economics of street use—have an important place and I shall do little more than merely mention them.

As I have already indicated, the development of local transportation is so interwoven with that of the community itself, that many of our problems are likewise public problems. If we are to unite upon the advocacy of measures based on certain general principles, these principles must be sound from the standpoint of the public interest, not in one community alone, but in cities of various sizes and varying characteristics throughout the nation. We know that the action of one community frequently affects many others. We have had ample evidence of this in matters of franchises, fares and taxation. We also know that each operating property is dependent for its development upon the state of the technical art in the industry as a whole. This is illustrated by our present efforts to develop more satisfactory types of car and bus equipment. With all this in mind, therefore, the importance of co-operative planning and co-operative action cannot be over-emphasized

I am convinced that the business in which we are engaged renders a vital and necessary service which the 16,000,000,000 passengers who use it each year could not get along without.

There is every reason to believe that the business of providing public transportation service can be put on an economically sound and stable basis. I am fully aware of the difficulty and complexity of the problems involved. But I am hopeful that with your continual confidence and co-operation we may make steady progress and that my reports in the future may be expressed not in words but in results.

Meeting the Industry's *Equipment Problem*

Progress of the work of the Presidents' Conference Committee summarized in a significant address before the American Association

By THOMAS CONWAY, *Jr.*

President Cincinnati & Lake Erie Railroad
Chairman Philadelphia & Western Railway

Thomas Conway, Jr.

IT HAS been generally recognized by the industry that progress is required in two directions: (1) improvement in the character of service rendered so as to make it more attractive to present and prospective patrons; (2) a substantial reduction in costs. Both factors are controlled largely by the design, age, condition, performance, weight and cost of the equipment operated.

Thus we are brought to the inevitable conclusion that the cars which we operate represent in large measure the key to our problem. For several years the industry has been aware of the evils attendant on the operation of the large number of obsolete and heavy cars that are in service, and it is gratifying to note that in the year 1929 a total of 1,496 new cars and locomotives were purchased by electric railways as compared with 897 in the year before.

In spite of the fact that the total number of cars purchased by electric railways in 1929 was 68 per cent in excess of the 1928 purchases and that a substantial number of cars were purchased during the first part of the current year, the progress of the industry in modernizing its equipment continues to be discouraging. There are approximately 74,000 electric railway passenger cars in the United States, most of which are in regular use. Half of these, or almost 40,000 cars, are over twenty years old. These old cars are excessively costly to operate, noisy, obsolete in appearance, and not calculated to stimulate riding or to earn a profit.

What is the reason for this anomalous situation? Why is it that an industry with over $5,000,000,000 of invested capital should cling to antiquated equipment instead of ruthlessly scrapping obsolete facilities as a means of promoting progress and increasing its earning power? The most important reason is that, while substantial progress has been made in the evolution of the railway car, it has not entirely measured up to the expectations or requirements of the shrewd railway executive. The competitor of the railway car is the private automobile and by the standards of the automotive industry the comparative progress of our industry in large part must be measured. Judged by that standard, the evolution of the urban railway car has failed to keep pace with its rival. The 1930 model automobile is infinitely superior to the product of five years ago.

While the private automobile and motorbus are decreasing in cost, the electric railway car is constantly becoming more costly. Many operators refuse to buy cars to replace old equipment now in service because of what they regard as the prohibitive cost of the type of equipment which they would consider purchasing.

About a year ago a comparison of views and an exchange of ideas began between a number of the senior executive officers of large electric railway properties concerning the problem of car improvement. The upshot of the matter was that at the October, 1929, meeting of the Advisory Council, this question was brought up and thoroughly discussed, and it was informally agreed that steps should be taken by the railway operators to expedite the development of the urban railway car. To that end, I was requested to make a study of the problem and to prepare for submission to a group of the senior executives of our large city properties a memorandum outlining a plan of procedure to achieve the desired end. A notable meeting of the executives of such properties was held in Chicago in December last at which the so-called Presidents' Conference Committee (of which I have the honor to be chairman) was organized. Steps were taken to secure subscriptions aggregating at least $500,000, in roughly equal proportions, from the interested railway companies and from the manufacturers.

At the last meeting of the Presidents' Conference Committee held in Chicago on May 22, a subcommittee was elected to select a chief engineer and to make arrangements therewith. After a most thorough canvass of the problem, the committee unanimously decided that a knowledge of car building or of the operation of railway properties was not a prerequisite to the position and in many ways might constitute a handicap, particularly in the highly competitive situation which exists in the car building industry. We were advised by some of the foremost engineers and business executives of the country, who have had wide experience in handling research projects, that what was needed was an engineering executive—a man who has demonstrated his ability to conduct large research projects and bring them to a successful conclusion; who has shown his acumen in the selection of technicians, each capable of handling a particular part of the work, and who possesses the personal qualifications of winning co-operation and begetting confidence from the engineers and executives of the various manufacturing interests involved.

After a most careful study of the men suggested, the nominating committee, elected by the Presidents' Conference Committee, has unanimously selected C. F. Hirshfeld of Detroit, Mich., who for many years has been head of the research department of the Detroit Edison Company, as the chief engineer of the committee. Mr. Hirshfeld has had a wealth of experience in conducting research projects for his company, for the National Electric

Light Association, and for other interests. He is not a railway car specialist; he is relying upon the active co-operation of our master mechanics, of the engineers and technicians of the car builders, the manufacturers of electric equipment and of braking apparatus, and of other groups whose products enter into the railway cars.

In considering how a group of associated operating companies may bring about a radical improvement in the present car situation, which is so important to the industry, two broad courses of procedure are open. The first is for these properties to appropriate a substantial sum of money, hire engineers and proceed to take the initiative in designing, building, and testing one or more cars to meet their requirements. Although this procedure might seem to offer the most direct method of attacking the whole problem and of bringing about immediate results, it contains a number of serious objections, one of which is the problem of finding engineering talent which may be expected to be more successful in producing results under operator sponsorship than could be achieved by keeping the initiative entirely or in large part in the hands of the manufacturers who have had very wide experience in design and in the details of construction.

It seems wise and most important that the whole future of car development should not be contingent upon the success of any one or even several designs. The best results can be expected through the simultaneous effort on the part of as many individuals and groups as can be interested in the problem. By working through and with the present manufacturers, the committee may expect to stimulate the maximum number of simultaneous development projects, which in turn is the method which seems to offer the greatest assurance of ultimate success. By pooling the influence of a representative group of important properties, it can co-ordinate the efforts of the manufacturers and eliminate confusion.

The committee plans to take advantage of the natural stimulation of competition in attempting to achieve its objectives. Competition between manufacturers in the effort to excel is potentially a strong force, which, if properly stimulated and directed, will tend to accelerate development. It would be unwise, therefore, to stifle this competition by taking development initiative out of the hands of existing manufacturers.

The purpose will be to try out each new idea that is suggested and considered worthy, in such a way that there will be a minimum of duplicate effort and a gradual process of eliminating those features found to be impracticable or too costly. Thus, through co-ordinating the experimental work which is now being done individually by the participating properties, it is believed that the work can be organized among them and among the manufacturers with whom they now deal separately. In addition to its other advantages, the cost to the companies would be considerably less than that for individual effort.

In brief, the program of the Presidents' Conference Committee is one of co-operative effort with every group interested in any way in the construction of railway cars. The committee does not contemplate going into the car building business; it is not seeking to destroy or restrict the field of activity of any car builder or car equipment manufacturer. It will strive to co-ordinate the efforts of these groups; to bring to a focus the minds of the engineers and technicians in these industries; to stimulate inventive ingenuity; to finance worthwhile experiments and to try out the experimental product to determine its practical usefulness.

It is estimated that the railway properties whose chief executives are members of the Presidents' Conference Committee represent over 60 per cent of the potential car buying power of this industry. It is unusual for a customer to match dollars with a manufacturer for the improvement of the manufacturer's product, but our need is so great that every railway company which has subscribed has done so realizing that if the effort is crowned with any measure of success, it will be repaid many fold the amount of its subscription in the lessened cost of new cars and the betterment of the car builders' product.

The subscribing companies have underwritten the work of the Presidents' Conference Committee for a period of three years. Research and experimental work takes time and it is believed that substantial results cannot be expected in a shorter interval. In order that there may be no misunderstanding, let me make it very clear that whatever advantages accrue from the work of the Presidents' Conference Committee will benefit the entire industry. This is not a little clique of railway companies seeking to gain a selfish advantage. Any railway company may participate in this effort upon the same general basis as those companies which have heretofore subscribed and their co-operation and cash will be most welcome.

In conclusion let me dwell upon one matter which is most important. I hope that the activities of the Presidents' Conference Committee will not deter any railway company from buying new equipment until the committee's work is completed. This would be a great mistake both from the standpoint of the railways in question and the industry as a whole. All progress cannot be wrapped up in the work of this committee. The committee hopes that our member companies will continue to buy cars as usual and, in fact, in larger quantities than heretofore. Many ideas can be tried out in this new equipment to the great advantage of all concerned; many valuable lessons can only be learned by actual experience. In exhorting other companies to go forward and purchase new equipment, may I call your attention to the fact that the company represented by the chairman of the Presidents' Conference Committee has had delivered to it within the last few days new interurban equipment in sufficient amount to enable it to operate its entire interurban property with cars none of which is over three years old, and that the company represented by the vice-chairman of the Presidents' Conference Committee has booked within the last few weeks the largest order in 1930 for electric railway equipment. A substantial number of new cars will be purchased within the next few months by other members of the Presidents' Conference Committee who recognize the futility of waiting until the work of the committee is completed.

The railway industry has suffered untold losses through indecision and delay in striking out boldly along the line of experimental research, which has proved to be the salvation of most of the successful industries of America. Of one thing only can we be certain, and that is that success never comes to him who stands still. We must keep moving; we must show the people of the United States that there is vitality and life in our business; we must buy new equipment—the best that can be designed at the time the purchase is made—relying upon the fact that inventive skill and engineering ingenuity can be relied upon to enable us to bring this equipment up to a reasonable standard of performance and at a reasonable cost.

Transportation Men Are COMMUNITY BUILDERS

Definite obligations rest on the utility, the community and the regulatory body, said the author in addressing the American Association

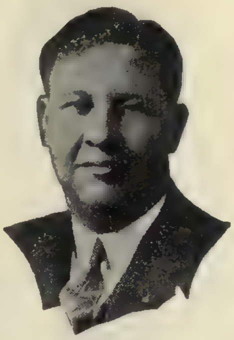
By JOHN E. CURTISS
Chairman Nebraska State Railway Commission

WE ARE living in a day and age of tremendous rush and hurry. We are being carried along in an hysterical atmosphere of getting some place quickly, and of doing things rapidly.

Accordingly, I suggest that in the midst of this atmosphere of speed, it is well to gather together on occasions such as this, renew acquaintances, and discuss problems of common interest and importance. Surely from such a convention as this comes enthusiasm for the daily task.

I believe in optimism, in spite of Owen Wister's thought that common sense repudiates both optimism and pessimism. Someone said an optimist is a man who sees the light that isn't there, and a pessimist is a fool who is trying to blow it out. As between those two types, and we have them both in this great country, we all prefer to mingle with the man who attempts to see the light that perhaps isn't always there, but in spite of that fact, is struggling forward and on.

Quite naturally there are problems to be solved. Problems of government, problems of industry. They are frequently inter-related. Your industry has them, every industry has them, and in their solution we must have leadership. You have perhaps heard of the fellow who was standing along the curb when a great crowd dashed by. He watched it pass and then started out on the run to catch up with it. He pulled a fellow from the rear of the crowd and said: "Where's this crowd going?" The man replied, "I don't know." Again he rushed on and caught up with the crowd and pulled another man out of the rear of the crowd and said, "Where's this crowd going?" This man replied, "I don't know, I'm merely following it." The stranger said, "Well great heavens, man, I've got to find out where this crowd's going. I'm its leader."



John E. Curtiss

There is plenty of that kind of leadership today. The kind of leadership that involves following the crowd in the direction that it goes, rather than being out ahead pointing the direction in which it might properly go. Plenty of leadership that involves bringing together facts—but not too many, not enough to be embarrassing — mixing them together with a loud noise, indulging in mental gymnastics, a bit of legerdemain, some violent waving of the arms, and then, like finding the rabbit in the hat, reaching down in the can and pulling out the answer. We need men and women today who can see straight, think fast, and above all else, act honestly.

Indeed we live in a universe of law. This is true in the field of science, but it is just as true in the field of economics and of finance. Certain fixed results are sure to follow certain definite transactions. There is no financial escape from receivership when a company fails to earn fixed charges. There is no escape from embarrassment that follows. both to the utility and the community, when such a return is not paid on the value of the properties as will attract the necessary capital to provide for the proper development of the industry. There is no escape from unfortunate results that follow improper public relations, when the management, that is, the employer and employee, fail to understand the customer, and in a courteous manner render the highest type service possible.

And so, in the midst of constant change, we move forward. Accomplishment that a few years ago was declared impossible, is today accepted as commonplace. Probably the most important discovery made in our generation is that we know practically nothing about anything. Having discovered that, we place ourselves in the position to move forward, and no industry can be listed among the casualties so long as it understands that there are further problems yet to be solved and that they can be solved—will be solved—in the light of constantly changing conditions.

So I say, change is the order of the day, and I know of no industry more directly affected by this change than yours. And in that change, I conclude, comes the inspiration for the subject assigned me for brief discussion—"Public Responsibility in the Regulation of Competitive Industry."

Thirty years ago your industry had well nigh a complete monopoly in its field. You furnished the fastest, most certain, most satisfactory urban transportation. Indeed the opulent citizen owned a team of high-stepping horses and a fine rubber-tired buggy, but this was a luxury enjoyed only by the few, and even those few, together with the masses, depended on you for local transportation.

But we have pressed forward—at least, we hope it is forward. Today the horse and buggy have passed from the picture, and the smell of the exhaust and the roar of the cut-out are endured on every highway, as countless thousands of automobiles—there are more than 5,000,000 new cars sold each year—dash by. Thus your industry, once a complete natural monopoly, bringing to the people of our large communities one of the necessities of life, is now confronted with the keenest of competition from the privately operated automobile, and the publicly authorized taxi-cab. I know of no street railway company in the United States that has been able to avoid the acute problems resulting from this condition.

But with respect to your industry, we have passed through another cycle, and, whereas originally you were a natural monopoly, you now find yourself confronted with the keenest of competition. What is the public responsibility respecting regulation under such circumstances? It is a fundamental principle of regulation that charges authorized by the regulatory body shall be sufficient to pay operating expenses under economical and efficient management and in addition, a fair return upon the value of the property. This principle of course prevails whether the utility regulated be a competitive industry, or a complete monopoly. In other words, the end to be attained is the same in either instance. The means to the end may be different. It appears to be altogether proper that in reaching the end, a different attitude might properly be displayed by regulatory authority, where competition exists, than in the regulation of that utility which operates as a complete monopoly. The Supreme Court of the United States, in the Southwestern Bell Case, said: "It must never be forgotten that while the state may regulate with a view to enforcing reasonable rates and charges, it is not the owner of the property of public utility companies, and is not clothed with the general power of management incident to ownership."

It is always a matter of judgment as to just where management ends and regulation begins. Therefore, as competition reappears in a definite way, it seems that the heavy hand of regulation might be lifted, in degree at least. Competition itself makes for very definite regulation—indeed regulation of rates, service and operating expenses. To be specific, the competition which now confronts your industry, presents a very definite limit to the extent to which rates can be increased, else the point of diminishing return be reached. This very fact compels the most efficient and economical operation. Again this same competition impels you to render the very highest type service possible, that your patrons may not be lost to the competitor. It is a patent fact that officers involved in the management of a utility, have as deep-seated a desire for the successful operation of that utility, as those charged with the responsibility of regulation. Furthermore, they have, of necessity, a more comprehensive understanding of company problems and the possible methods of solution, particularly respecting the manner and methods of meeting competitive effort.

Accordingly, where a regulated industry is faced with actual and effective competition, governmental authority should seriously consider that fact in its regulatory effort. Such regulatory action as is necessary should be prompt. The local industry might easily "starve to death" if regulatory action be tedious and long delayed. And receiverships are always highly unfortunate, not only for the industry, but also for the community. Considerable latitude should be permitted the management in solving matters of service. In so far as it is possible, the management should be given wide discretion in either reducing or increasing service furnished, that competitive effort may be properly met. Again, choice should be permitted the management in reaching conclusions concerning matters largely managerial, such as wages and salaries paid, the proper allowance for advertising, the manner and form of service.

A sympathetic understanding between the utility, the regulatory body and the public served, is highly important and should always exist. The interest which each of these groups has in the problem is a common one. Quite naturally the public does not care to pay a rate higher than necessary, and yet the public has a very definite interest in a rate which is high enough to provide a service that is certain, satisfactory and modern. Such service can only be furnished when a return is paid in amount sufficient constantly to attract the capital necessary to keep the industry modernized. It is, of course, the legal obligation of a regulatory body to grant such a rate.

Confronted with competition, the importance of public relations cannot be over stressed. Whatever the attitude and action of the regulatory body may be, the industry finds that unfortunate public relations can be highly disastrous. In the main, this responsibility is yours. I regard it as your privilege and your obligation to acquaint the public with your problems—problems of finance and service matters. Your contact with the public is in the nature of partnership relationship, and we discover that it is not always a silent partnership, in so far as the public is concerned. Too much silence on your part in honestly explaining your problem to the community you serve may mean some unfortunate noise on their part at a very inopportune time.

I can't say that I am entirely sold on the philosophy which causes us to say, "The customer is always right." He may not be, and it may be your unfortunate obligation so to inform him. Rather would I say, give your patrons a square deal always, and then see that they know they are getting a square deal. Keep no secrets from them. Tell them the story of your problems honestly and constantly. Let them discover that your problem is a community problem. That such misfortunes as come to your industry are verily community misfortunes. Tell them the truth, the whole truth and nothing but the truth.

For indeed you are supplying a basic fundamental community need. The time has not yet arrived, nor does it appear to be imminent, when local transportation service for hire can be abandoned. We have observed the operation of street railways under receivership. In fact we have seen total abandonment of street railway service, temporarily, and in each instance we have seen all manner of business temporarily paralyzed as a result. Accordingly there must be real satisfaction to you in a knowledge of the fact that yours is a labor of service—that you are indeed community builders.

With no thought of being sentimental, I recall the story of the three stone layers. A stranger had been watching their effort from afar. He approached the first and inquired as to what he was doing. With a grunt he said, "I am working for $6 a day." To the second he directed the same query, and discouragedly the man replied, "I am laying stone." To the third man he addressed the same inquiry. For a moment he hesitated, his eyes flashed and his face beamed satisfaction as he said, "Sir, I am building a cathedral." I know of no industry, in spite of the change of the day, which can still say with such satisfaction, "Sir, we are building a community." Certainly in that effort, those charged with the public responsibility of regulation, recognizing a real competition which constantly challenges you, should be prompt and courageous in meeting that responsibility—should approach the problem with a sympathetic understanding that the best interests of the riding public, the community and the utility serving may be safeguarded.

Speeding Up Service

The speaker, addressing the American Association, told what has been done in San Francisco by scientific scheduling

By SAMUEL KAHN
President Market Street Railway,
San Francisco, Cal.

Samuel Kahn

EXPIRING franchises; a public somewhat uninformed, often misinformed; structures and equipment in good physical condition but not always embodying the last details of design to meet increasingly exacting passenger demands is a summary of the situation of the Market Street Railway when the present management took it over.

Just what does the public consider desirable in a 1930 street car ride? In following that quest, except for the date, we are treading the same trail followed by the horse car operator. He was required to furnish a speedy ride, at frequent and regular intervals, to carry the passenger in comfort—yes, even luxury—for that day and age. Was not the board seat of the horse car upholstered with its fine Brussels carpet a luxury in the days of plank sidewalks and mudhole streets?

From our experience in San Francisco it seems there can be little doubt about the public's demand for a quieter, smoother ride. The use of rubber shock pads between car body and bolsters; acoustical cloth under the car floor, under the trolley base, and under the air pump base have shown marked results with our own equipment—of all ages and designs.

Are new motors, quicker pick-up and quicker acceleration the only answers to the demand for greater speed without greater hazard? That these features are most desirable is beyond question, of course. But what of the street railway property that is not in a position to install such new equipment? Must it forego the essential benefits of more speed without more accidents?

It has been our experience that it need not. For instance, without change of motive equipment our speed has been increased from 9.4 m.p.h. four years ago to very nearly 11 m.p.h., day and night average, including all stops and delays except layovers. This has been done with a reduction of operating cost which materially helped in attaining an expense reduction which was greater than revenue decline last year.

Service to the public was not decreased, but rather increased 800,000 car-miles annually compared with four years ago. This car-mile increase served to absorb car-hour reductions sufficiently to obviate any reduction in operating force beyond the normal turnover, thus avoiding hardships to employees.

At the same time energy consumption has been reduced, and accidents substantially decreased.

UTILITY TAXATION

Advantages and disadvantages of gross receipts tax are set forth in a paper presented before the American Association

By M. D. LACK
Tax Counselor
California Taxpayers Association

IN CALIFORNIA, the tax situation reached a climax in 1910, when a constitutional amendment was adopted completely changing the revenue system of this state from the uniform *ad valorem* system for the support of both county and state to a separated system, setting up different sources of revenue for state and local purposes. By this separation, there was turned over exclusively to the state for its support those classes of properties such as public utilities, banks, insurance companies and the like which rather readily fell into a class whose activities were not circumscribed by county boundaries, leaving to the counties such properties as could be said to have a local situs.

The act of separation provided a tax measured by gross income, or gross receipts, for the former classes, with gross premium taxes for insurance companies, a capital stock tax for banks, and a franchise tax for business corporations; the tax to be collected from these classes was designated as strictly and exclusively a tax for state purposes, at least payable exclusively into the state treasury, and subject to its appropriation.

The state tax on these classes of taxpayers was made a tax in lieu of all other taxes and licenses of every kind, except payments agreed to be made to certain subdivisions for rights-of-way, franchises and the like, and neither the counties nor the cities were thereafter allowed to levy any tax against the property of these classes, when such property was used in the operation of their business, or in the production of the gross income which served as the measure of the state tax.

In return for the withdrawal from taxation from the counties of these classes of property, those subdivisions were no longer required to collect or to pay any tax for state purposes on their remaining properties, except that the act contained a clause reserving the right, never yet brought into use, for the state, in case of an emergency, to levy an *ad valorem* tax on all classes of property, both state and local, equally, to take care of such emergencies.

Advantages and disadvantages of the California gross receipts tax might be summarized briefly as follows:

First, as to its advantages: It is certain, not subject to variation because of too much latitude for the exercise of individual judgments; it is simple of administration; it substitutes one central state authority with which to deal in the consideration and administration of the tax on operative property in lieu of a number of independent officials limited only by the number of cities and counties in which the property is operated.

Objections that may be urged against it are: Inequalities of tax burden between members of the same class of operators or utilities; tendency to remove the intelligent interest in and influence upon state expenditure programs by relieving the citizen of any direct tax for state purposes; creation of a tendency of both state and local subdivisions to transfer expenditures from one to the other, and, more serious still, for particular locally-supported activities to advocate additions to their income or revenues by persuading local citizens to join them in advocating that the state make a new or greater contribution to such activity on the theory that the local portion of it is too great by comparison, and thus securing their co-operation to bring about increased state contribution on the almost universally erroneous theory that it will reduce the local tax burden; the inclination to discontent between the two classes of taxpayers, growing out of the fact that the different methods of levy are not easily comparable as to equality, with the resultant tendency to conclude, on the part of one group, that the other is carrying less than a fair share of the load.

Interurban Revenues

Means of popularizing passenger service and attracting freight business discussed before the American Association

***By* D. W. PONTIUS**

President Pacific Electric Railway, Los Angeles, Calif.

REVENUE prospects of the future for the interurban electric railway are, to a great extent, what we make them. We must recognize the industry as a merchandising organization since transportation is the article for sale. There are certain groups of people who will buy our transportation because it fits their need; they realize its many advantages and are quick to see our faults. These form a large and important part of our patronage, and will stay with us so long as the service is satisfactory. There is another group who do not use interurban railway service, but who certainly should use it. At a much higher cost than rail service, they drive their automobiles to shop or to work. A large percentage of this group must sacrifice other things in order to do so. Efficient, dependable service with high-class, modern equipment will eventually bring a great part of them back to rail travel.

D. W. Pontius

Speed of service is an important point, and is demanded by present and prospective patrons. For this reason, we must encourage and to some extent participate in important grade separations; we must protect our private rights-of-way against further unreasonable opening of grade crossings, and endeavor to have eliminated all crossings now established when not essential.

Cleanliness of equipment, courtesy and attention of the platform men is an important feature that must be given constant attention to attract and hold business. Noise elimination is worth while, and this feature is now being given some much-needed consideration.

Retirement of obsolete equipment has been deferred perhaps too long in many cases. While this has been because of the necessity of keeping operating costs down to meet the revenue, undoubtedly this has been carried to extremes in some cases. There is a demand for first-class equipment that must be met.

Serious consideration must be given to the matter of fares. Our company has experimented with reduced fares extensively during the past three years. Fares are now on an unusually low basis, but we are convinced that the right step has been taken to increase the volume of traffic.

What applies to passenger traffic also applies, in a general way, to freight traffic, with the possible exception that probably the competition is more intense in connection with freight. The delivery of freight by trucks directly to the merchant, commonly called "store-door delivery," is, in my judgment, the strongest factor in this competition.

Retrieving of lost less-than-carload freight traffic and promotion of new less-than-car-load business has been accomplished to a gratifying extent on the Pacific Electric Railway by the establishment of store-door pick-up and delivery. This service, although only begun in March, 1929, at 28 stations, has been extended to 51 stations; showed an increase of 12 per cent in the railway's less-than-car-load tonnage between March and September; and in the fifteen months since its establishment, less-than-car-load tonnage has increased 100 per cent. The railway's cost per ton for handling such freight at Los Angeles has been reduced about 18 per cent. The astonishing and very pleasing part of this is that of the business the "store-door" feature has brought in 95 per cent has been new accounts.

Advisory Council Activities Outlined at Banquet

Announcement made of selection of research director. Coffin prize presented to Youngstown Municipal Railway. Transportation problems discussed by A. W. Robertson

A SUMMARY of the activities of the Advisory Council of the American Electric Railway Association for the past year was given at a dinner in the Palace Hotel on the second night of the convention in San Francisco. Nearly a thousand delegates and guests filled the Palm Court and Rose Room. Other features of the evening were the presentation of the Coffin Award and an address by A. W. Robertson.

The meeting was opened by J. N. Shannahan, chairman of the Advisory Council. In speaking on the subject of its activities, Mr. Shannahan reviewed the five years since the Advisory Council of the American Electric Railway Association was organized under the chairmanship of B. C. Cobb of New York. Continuing, he said:

"The members of the Advisory Council represent a large proportion of the nearly six billions of capital invested in the business of providing local transportation service to American communities. The idea in the minds of those responsible for the organization of the Council was that in bringing together these men of large affairs, of wide experience and broad vision, their collective judgment and advice would be of the greatest help in working out the many baffling problems with which the industry has been confronted for a decade. These problems have been materially complicated by the necessity for keeping pace with the growing requirements of modern communities, while at the same time attempting to improve and modernize our facilities to meet new conceptions and new standards of public transportation service on the part of the people whom we serve.

"The men responsible for meeting the demands of the people for adequate, safe and speedy local transportation are alive to their responsibilities, and anxious to so satisfy the riding public by the character of the service they furnish that everyone will acknowledge that such service is in fact an essential, yes, indispensable, need of the community; service of such a character that the car rider will gladly pay such a fare as will enable these companies to compete in the money markets of the world for the funds so necessary to provide these extensions and betterments in which the riding public has so vital an interest.

J. N. Shannahan,
Chairman Advisory Council

"There is no mystery regarding the cause of the change in the public's conception of what it is willing to consider satisfactory transportation service. The rapid and remarkable development of the automobile created new standards of speed, convenience, and even luxury in transportation. This threatened to make obsolete much of the equipment and other facilities of our companies. At the same time, rapidly rising costs of materials and labor made the most rigid economy imperative and prohibited sweeping replacements of physical property.

"But while the public approved the expenditure of vast sums for the construction of streets and highways, without which the rapid development of the automobile would have been impossible, it failed to permit the modernization of public transportation facilities by insisting upon the retention of obsolete franchises, obsolete fare schedules, and obsolete taxes and imposts of various kinds. These have been the basic obstacles to the modernization of public transportation facilities. They have had much the same effect in curtailing the improvement and extension of community transportation as a failure to build roads and to improve streets would have had upon the development of the automobile. As a consequence, public patronage of transportation facilities which came to be looked upon as obsolete and out of date, was rapidly curtailed to merely necessity riding.

"Because the people as a whole agreed to assume the cost of adequate roads and highways, they have made possible the development of the automobile as we know it today and have permitted the automotive business to grow into one of our largest and most important industries. It has become a very important factor in our present industrial structure, and nothing should be done to injure it. When the public understands that obsolete methods of dealing with its local transportation problems constitute the primary cause of many of the difficulties faced by cities of various sizes throughout the country, the way will have been opened to that rapid development and improvement of community transportation facilities which is so greatly needed today.

"For the past four or five years there has been considerable activity on the part of individual operating companies and manufacturers in developing improved type of street cars, suitable for modern traffic conditions and designed to meet the transportation standards of a public whose tastes and transportation standards have been so materially affected by the convenience and luxury of the automobile. The Advisory Council, sensing the need for co-ordination of individual activity in meeting this common problem, at the last convention authorized the organization of a special committee of executives under the chairmanship of Dr. Thomas Conway, Jr. That work has been consistently pressed forward since that time. A careful analysis of the whole car and equipment problem in the industry was necessary before a definite plan could be developed. This, however, has been done and as a result the electric railways of the country are about to launch a co-operative program of research and development, which has long been needed and which, if successful, will be a most important forward step in meeting one of our most acute problems.

"Dr. Conway's committee, after a careful study of the problem, decided that in the selection of a chief engineer to have immediate charge of the work of research and development, it should choose not necessarily a man familiar with the construction of cars nor even with the operation of them, but rather an experienced and competent engineering executive — a man who has demonstrated his capacity to conduct research of large projects and bring them to a successful issue. The committee believes it has found the right man for this work in C. F. Hirshfeld of Detroit, Mich. Mr. Hirshfeld has been for years head of the research department of the Detroit Edison Company. He has had an extended experience in carrying on research work for that company, for the National Electric Light Association, and for other important interests. His is a great task and can only be brought to success with the cordial support and help of all those intimately concerned in the building and operation of the electric car.

"The Advisory Council commends this project to the industry and to the public. Recognizing that there are many street cars in operation today that are badly in need of replacement, it feels confident that the development of designs to meet modern traffic conditions and which will at the same time eliminate much of the popular impression that the street car is an obsolete means of transportation will prove entirely feasible. A group of important railways and large manufacturing companies are backing this project, and it is confidently expected that there will in a relatively short period be available improved types of cars which will make replacements of many existing cars economically practicable."

Mr. Shannahan then introduced the toastmaster of the evening, President Paul Shoup, who again welcomed the delegates from all over the country to the convention and to San Francisco. President Shoup read the report of the committee on the Charles A. Coffin Foundation Award and presented to C. S. McCalla, president and general manager Youngstown Municipal Railway, the Charles A. Coffin Medal and the accompanying check for $1,000.

The address of the evening was made by A. W. Robertson, chairman of the board Westinghouse Electric & Manufacturing Company. Mr. Robertson offered as one step in the solution of the urban transportation problem, the establishment of "transportation districts" for a given community. He urged a closer co-ordination and co-operation between the railways and the various official factions of the area served for the purpose of obtaining better operating conditions under revised franchises and adequate fare structures.

Mr. Robertson further stated that mass transportation is as essential to public service as water, gas, telephone, or any of the other common modern conveniences. For more than a generation street railways have furnished this transportation to our cities. The development of the automobile has reduced the earnings of the transportation companies, but the need of some form of mass transportation is as real as ever. If it were not for the congestion on our streets and the reduction in the number of riders on our street cars, this form of surface transportation might well compare in speed, comfort and safety with any which the world has known, but due to the congested streets and reduced revenue under which the street railway operates, it has to do without many things which the transportation company and the public might otherwise consider necessary.

Many things have been done and are being done to assist the transportation companies in rendering service, but real forward steps cannot be successfully undertaken until the business men, the people at large, and the civic authorities realize fully that the handling of huge masses of passengers in our municipalities is a very complex community problem, and whole-heartedly and constructively co-operate with the local transportation company in solving it. Traffic congestion in our cities not only causes loss and inefficiency to the street car company but also represents a gigantic economic waste to the community. Every city is suffering from its blight. If we can solve the traffic congestion in any acceptable way we solve our mass transportation problems at the same time.

American Executive Committee Breakfast Meeting

REPORTS of several committees of the American Association were presented briefly at a breakfast meeting of the executive committee held on Monday at the Fairmont Hotel. G. C. Hecker, general secretary, presented the report of the publications committee, suggesting that renewed consideration be given to the publishing policy of the association magazine, *Aera*. F. R. Coates told of the gratifying increase in the number of state and sectional associations which have joined the American Association. An outline of the insurance situation was presented by F. L. Butler in the absence of the committee chairman. Leslie Vickers, economist, spoke briefly concerning the work of the committee on taxation. Arrangements for the convention were commented upon briefly by W. V. Hill, who introduced the chairmen of the various local committees which were instrumental in the preparation for the meeting. It was decided, on the suggestion of J. H. Hanna, that a committee should be appointed to study the problem presented by changing conditions in the industry with a view to making corresponding changes in the organization of the association.

W. W. Wysor, president of the Engineering Association, E. H. Reed, president of the Accountants Association and J. H. Handlon, representing the president of the Claims Association, spoke briefly concerning the work of these affiliated bodies. It was decided that the next meeting of the executive committee should be held sometime in August at New York City.

COFFIN AWARD Won by *Youngstow*

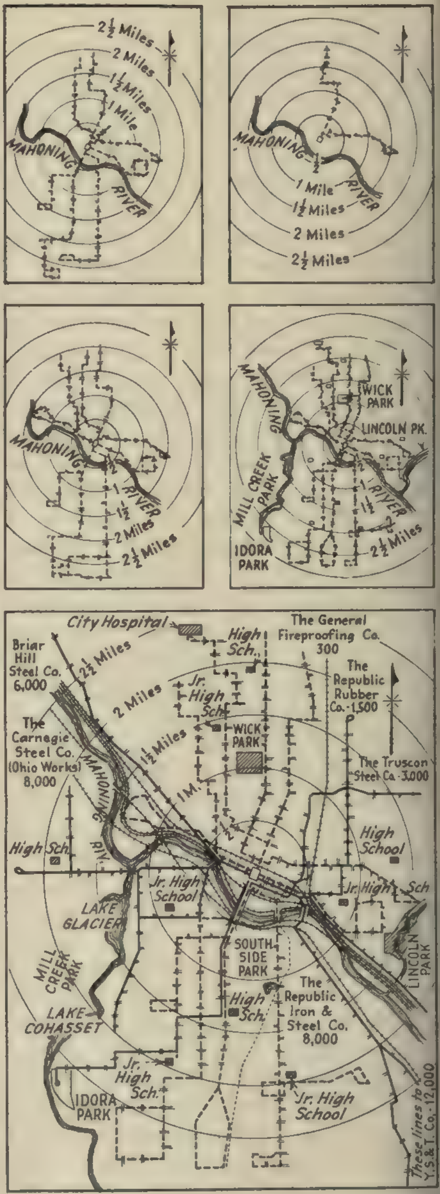
Modernization of equipment, plant and operating practices, co-ordination of rail and bus services, satisfactory public relations, and co-operation of and with employees mark year of progress. Briefs submitted by six contestants summarized

IN VIEW of its skill in successfully fitting the character and amount of service to the needs of the public and in effectively selling that service to the public, the Charles A. Coffin Prize for 1930 has been awarded to the Youngstown Municipal Railway, Youngstown, Ohio. Five other companies, which submitted a record of their accomplishments during 1929, made noteworthy contributions to the development of the electric railway industry. They are the Cleveland Railway, Cleveland, Ohio; Community Traction Company, Toledo, Ohio; Union Street Railway, New Bedford, Mass.; Eastern Texas Electric Company, Beaumont, Tex., and El Paso Electric Company, El Paso, Tex.

Six principal factors were considered in making the award: more riders and more revenue; friendly public; lower costs and increased reliability of service; increased safety for riders, employees and the public; co-operation between management and employees; and financial accomplishments. Seven electric railways have received this award since its establishment: the Chicago North Shore and Milwaukee Railroad, in 1923; the Northern Texas Traction Company, in 1924; the Pittsburgh Railways, in 1925; the Pennsylvania-Ohio Electric Company, in 1926; the Grand Rapids Railroad, in 1927; the Virginia Electric & Power Company, in 1928, and the Chicago, South Shore & South Bend R.R. in 1929.

New Franchise Assures Continued Success in Youngstown

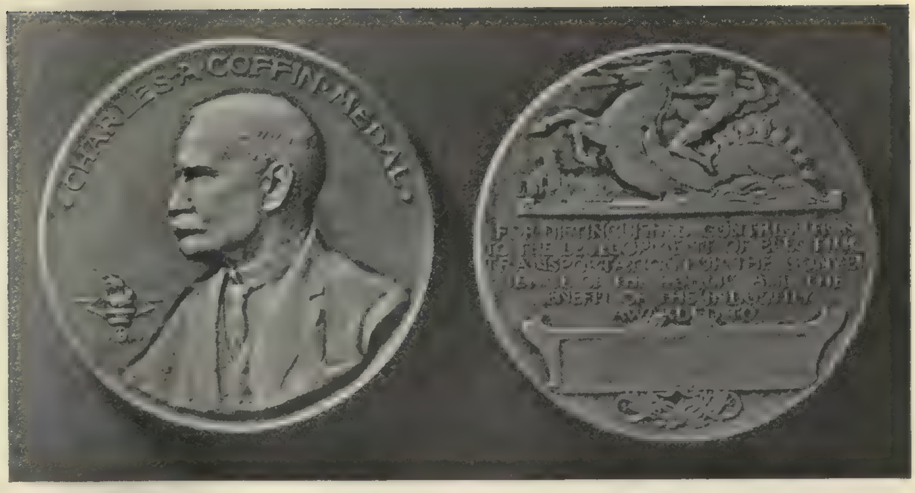
FULL realization of an extensive program of modernization which included a new franchise, new cars and unbroken progress in the standardization of operating methods, materials and economies was the contribution of the Youngstown Municipal Railway, Youngstown, Ohio, to "the development of electric railway transportation for the convenience of the public and the benefit of the industry." This privately owned and operated utility is a part of the Penn-Ohio System which serves the city of Youngstown and suburban territory with an aggregate population of 216,000. Complete co-ordination of street car and bus services has been



Youngstown is now served by an efficiently co-ordinated system of car and bus routes. The four smaller drawings represent bus lines in 1922, 1924, 1928 and 1929. The larger one the complete system now operated

A complete program of rolling stock modernization

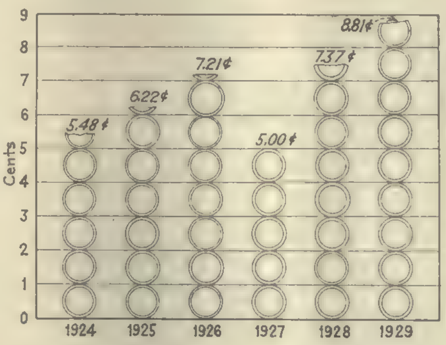
unicipal Railway



effected in this territory, the two being used as equivalent vehicles in equivalent service. On this property the bus is not parallel or supplementary.

The new franchise, made final by act of the city government on May 22, 1929, was the outstanding accomplishment of the Youngstown Municipal Railway. The negotiations, in open forum, with the leaders of business, finance and industry of the city resulted in a franchise which not only provides for flexible rate of fares, relief from unnecessary burdens, assurance from competition and genuine co-operation between the city and company in efficiently serving the traveling public, but also provides an arrangement financially satisfactory to the company and affords a basis on which it is justified in spending money for extending and improving its service.

The salient features of the franchise are: complete freedom from all obligations for construction of paving, or paving foundations, except such additional foundations as are necessitated by tracks; complete relief from any obligations for repair of pavement, except repairs actually occasioned by any act of the company; complete relief from all minor exactions such as sprinkling, street sweeping and cleaning, and burdens of this character. The franchise acknowledges the company's right to operate without cost or consideration over all bridges and grade separation viaducts now built and in case of rebuilding said bridges or viaducts, or the construction of new ones, at only such cost as the construction of tracks may add to the cost of the bridges or viaducts; deprives the city of any control over service or fares of the company in case the city should suffer, permit or aid competition with the company, with the exception of existing street railway and taxicab companies and provides that the cost of city control, including salary and expenses of street railway commissioner and his assistants, shall be paid by the city instead of by the company as heretofore.



Growth in net revenue in cents per mile before taxes and depreciation

An initial rate of fare of 10 cents cash, six tickets for 50 cents is allowed with provision for increasing and decreasing fares automatically, but with further provision that such sliding scale of fares shall not be impaired by fares other than the sliding scale placed in effect by agreement between the city and the company. Finally, the company shall receive after taxes and depreciation, 6 per cent return on its original capital value and 7 per cent return on all additional capital value, and further, the company shall participate in all excess fares over the rate stipulated to the extent of one-half after a surplus of $100,000 has been accumulated.

During 1929 the Youngstown Municipal Railway acquired thirteen of the most modern cars, of extremely low weight per seated passenger, high-speed motors, double-reduction drive and automatic foot controls. Thus it completed a program under which there does not remain a single street car in use on the property purchased prior to 1917 which has not been fully rebuilt.

The speed of the new cars means cash savings in actual service. The thirteen new cars purchased in 1929 develop an acceleration of 3½ m.p.h.p.s., and unusual deceleration. Advantage is taken of this improved acceleration and braking ability on the main trunk line extending the full length of the city from the industrial plants at Mosier on the west

has been carried out by the Youngstown Municipal Railway

side to those of Campbell, on the east side. Through the use of this new equipment 237 car-hours per day, or 6,665 car-hours per year, are saved in giving equivalent service. The actual economy realized through the substitution of this modern equipment is approximated at $80,000 per year.

The net earnings of the company available for taxes and depreciation and after the payment of operating expenses, including the purchase of power, have been steadily on the increase during the past seven years. In 1923 the net income was $250,967 and in 1929, $513,369. This increase is attributed to the constant attention to the popularizing of electric railway service in Youngstown and meeting the competition of private automobiles by improvement in character, speed, comfort, convenience and general attractiveness of the service rendered and by application of merchandising methods in selling this service.

Economies in operation have been effected as the result of original ideas and the application of ideas orginating with others so that revenue per employee has increased, unit revenue has increased, and unit expense has diminished. The largest net revenue in the history of the company resulted in the year 1929. Car and bus changes were reduced, the number of pull-ins cut and a variety of methods and practices resulting in satisfactory service to the public and improved financial returns have been adopted.

The Youngstown Municipal Railway gives evidence of its faith in the continued success of its operations in its plan for the continuance of further development. The budget for 1930 contemplates an expenditure of $543,400. This expenditure is all voluntary and, on a property of this size, manifests the faith the management of the company has, not only in the industry in general, but, under the present conditions, of its future in Youngstown.

Car, Bus and Taxicab Services Co-ordinated at New Bedford

CONTINUED success in the operation of an old, well-established railway is reflected in the claims made for the 1930 Coffin Award by the Union Street Railway, New Bedford, Mass. Aside from operating the railways more efficiently and economically, the company has benefited from the increased gross revenue obtained from taxicab and bus operations. While these new forms of transportation have been added, operating expenses have decreased markedly.

Comparison of revenues between 1928 and 1929 are reasonable and fair as there has been no refinancing of the company since the last issue of common stock in 1918 and there has been no increase in fares since May, 1927. The story of accomplishments reflecting the results of operating effort during 1929 are as follows: the gross earnings from operations in 1929 were $1,283,221 as compared with $1,286,624 in the previous year. This is a decrease of only 0.2 per cent, so it is fair to state that the gross earnings for the past two years were practically constant; during the same period the operating expenses decreased 3.9 per cent, or from $1,165,964 in 1928 to $1,120,118 in 1929; the operating profit after depreciation increased 35.1 per cent, an increase of $42,442; the depreciation rates in 1929 were not decreased over those used in 1928; the net operating profit, after interest and taxes, increased 71.9 per cent, or from $50,733 in 1928 to $87,223 in 1929 and the credit balance of the company was increased 6.2 per cent.

New cars purchased by the Union Street Railway are modern in appearance and equipment

For a number of years the Union Street Railway has maintained a traffic department which devotes the greater part of its time to analyzing riding requirements and making time-tables to meet the needs of the public. Not only has this given service where, when and as required, but it has been the means of saving thousands of dollars by eliminating unnecessary service. During 1929 this department functioned in such a way as to make it possible for the company properly to segregate its various classes of service. The following figures show the results of this work: 18,108 miles of bus, trolley and taxi operation were saved over the previous year's operation, or 0.1 per cent; receipts per car-hour increased from $3.46 to $3.47, and receipts per car-mile from 40.17 cents to 41.04 cents. The decreased mileage

A large, centrally located bus and taxi terminal has resulted in more efficient operation of the two services was due to increased schedule speeds, service adjustments and bus co-ordination, resulting in increased receipts per car-hour and per car-mile.

Practically all existing rolling stock has been rebuilt and remodeled into modern one-man cars. Modern de luxe interurban cars have been put in operation on the line between New Bedford and Fall River. The entire complement of older street cars has been kept in excellent condition and a series of new cars were purchased in 1918, in 1923 and in 1929. The latter cars are of the most modern type equipped for one-man or two-men operation. They resemble the automobile to some extent, the body being painted to produce the streamline effect. The cars provide seats for 44 passengers, and all seats are covered with leather upholstery. All mechanical equipment is automatic and is concealed from view. The windows are especially wide so that regardless of where a passenger is sitting he has a clear view outside. The cars weigh 17½ tons and are equipped with four 35-hp. motors. Fast accelerating and braking rates are attained.

An example of proper co-ordination between street car and bus is found in the service between New Bedford and Fall River, Mass., and Providence, R. I. The service, inaugurated in 1925 by the Union Street Railway, competed with the company's existing trolley lines that operated between New Bedford and Fall River, Mass. The rate of the fare charged on the buses is 50 cents between New Bedford and Fall River, and $1 between New Bedford and Providence. The motor trip between New Bedford and Fall River takes 40 minutes. The trolley fare for a ride between New Bedford and Fall River is 30 cents, and the running time 50 minutes. In these two services, patrons have the choice of the speed and rate of fare they desire. No local stops are made by the bus, while the street car accommodates all local patronage en route. The result of this co-ordinated service shows that the combined gross revenue of both trolley and bus operations has more than made up for the loss of trolley revenue. Decreased trolley patronage has made it possible to effect a decrease in street car expenses.

During 1929 the company purchased a large, centrally located gasoline station, which, in addition to having a large amount of land, had a permanent canopy extending over most of its property. It was possible to park several buses at a time under this canopy, and to accommodate the entire taxicab fleet on private property in front of this taxi and bus terminal.

The taxicab service performed by this company is based on its reputation for reliable, convenient and comfortable service. Taxicab fares are based on flat rates because of independent competition, but the company has been able to do a good business in spite of the fact that other long established companies charge rates nearly one-half of what the railway charges. Telephones are located throughout the city and have been used for a number of years by the railway inspectors and starters. By using these telephones, the taxicab drivers eliminate a great deal of dead mileage.

More Passengers and Fewer Accidents at El Paso

Spectacular Military Review
At Fort Bliss This Afternoon at 2 P.M.
Bus Service Extended to the Municipal Airport
Street Cars and Motor Buses to Easter Sunrise Song Service
Transportation Topics
See Juarez and El Paso
HEY!
Ride the Street Cars
Shop More 10 to 4
And You'll Avoid the Crowds
El Paso Electric Company

Timely advertising has resulted in increased riding in El Paso

HANDLING passengers of whom more than half are foreign born, serving two countries with dissimiliar laws and customs and increasing passengers and revenue, marked the accomplishments of the El Paso Electric Company for the year 1929. This company serves the transportation needs of El Paso, Tex., and Juarez, Mexico, as well as a large U. S. Cavalry Post at Fort Bliss, the municipal airport and a new industrial center.

THERE are approximately 141,900 people in this service area which are served by 80 passenger street cars, four work cars and fourteen buses, operating on 48.52 miles of equivalent single track. No rail extensions were made during the year, but additional co-ordinated bus routes were established to supplement street car service. The principal factors contributing to improvements are measures that have been responsible for both increased efficiency and added economy.

The operating revenue in 1929 was greater than for any year since 1921 when El Paso's normal population was augmented by some 60,000 or 75,000 soldiers concentrated for demobilization following the World War. The gain in gross receipts was $60,988 or 7.2 per cent above receipt for 1928. Street cars and buses carried over a million more revenue passengers in 1929, an increase of 5.82 per cent over the previous year.

Broadly speaking, the marked improvement in earnings made has been brought about by the speeding up of service, through the intensive sales efforts carried on throughout the year and by accurately fitting service to conditions. Speeding up of service was the result of faster schedules and closer supervision. A considerable portion of the rolling stock is new while the older equipment has been completely remodeled and includes the latest improvements in operating comfort and convenient details.

Merchandising plans carried out fully have embraced all the popular practices as well as many that are novel and which have been used in El Paso and Juarez with unusual success. The operators have been trained in courtesy, in safety, and in skillful salesmanship. Sales efforts have included house-to-house canvassing backed by the liberal use of newspaper advertising, pamphlets, inside car cards and various other mediums. The methods used to sell car rides incorporate credit sales of ticket books, department store cards, special service and other novel ideas.

One of the outstanding accomplishments of the El Paso Electric Company for 1929 was a further reduction in accident costs. Within the five-year period from 1921 to 1926 inclusive, this company effected a reduction in accidents equivalent to 76 per cent, as well as making other remarkable improvements in safety. In 1921 the company was experiencing 8.83 accidents per 10,000 car-miles which was reduced to 1.42 accidents per 10,000 car-miles in 1926. This low ratio was maintained until 1929 when a further substantial improvement was made with a further reduction of 68 per cent in the settlement of claims, suits and judgments. The amount paid in settlements during 1928 was $29,374 as against $10,402 for 1929. Safety contests, first aid demonstrations, honor roll systems, safety banquets and similar measures were used to maintain interest in accident reduction.

An excellent record for economy and efficiency in the maintenance of equipment has been made in the past and further carried on in 1929. Modern methods, original devices, improved practices and better facilities together with a highly skilled personnel have all contributed in this phase of operation. Particular attention has been paid in the recent past to the establishment of an upholstery department and the adoption of a centralized system for reclaiming scrapped material.

Large savings are reflected in improved construction methods as well as better maintenance practices. Original plans for track paving and similar measures have produced improved operating results at reduced costs. After a careful study of the different types of tracks and construction the El Paso Electric Company has standardized on a 90-lb. A rail, steel ties, crushed stone ballast and concrete pavement.

Concentration upon the concrete pavement is a measure of economy practiced in construction worthy of note. This, in general, is one-course construction, but in heavy traffic intersections or under other special conditions it is two-course construction, consisting of a rather lean base (1:3:6) and a granolithic surface of a much richer mix resembling a good sidewalk coping. For both, the company insists on a dry mix of good workable consistency. It has trained its crews to the point where the costs are way below that of the local paving companies and in addition it gains the most desirable end, that of having the entire job under its control.

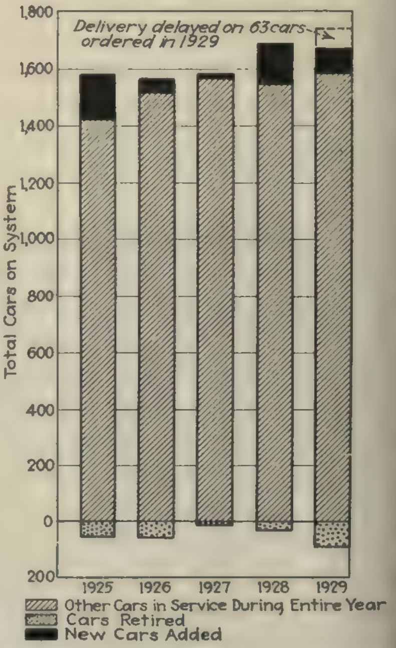
The construction program for 1929 called for a larger investment than that annually required for the past sixteen years. It included construction of a new power plant, a substation, a connecting transmission system and installation of equipment in the old power station necessary for the utilization of natural gas as fuel. The company also built a new reinforced concrete and steel bridge over the Rio Grande River to replace the old wooden structure.

In order to retire existing floating indebtedness and to finance the major portion of the construction program, $4,000,000 of 5 per cent bonds were issued in addition to the bonds already outstanding under a mortgage dated June 1, 1925. The bonds were sold to a syndicate of brokers for offering at a price of $95 to yield 5.40 per cent to maturity. The net to the company was $91. After discount and other expenses incidental to the issue, the net cost of this new money to the company was approximately 6½ per cent. This financing reflects a rather outstanding achievement since it was necessary to float this issue in June during a highly speculative market.

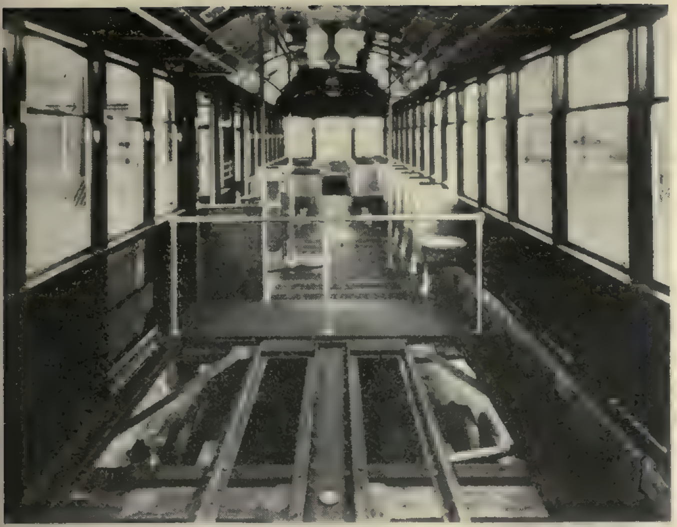
Cleveland Railway Pioneers with New Cars and Maintenance Equipment

FOREMOST in the Cleveland Railway's 1929 program to popularize electric railway service and to meet the competition of private automobiles was the purchase of 100 new single multiple unit control type of cars, following a purchase in 1928 of 50 new single-unit and 28 articulated trains. These 206 cars have given to the Cleveland public considerable convenience and generally attractive service. They have been designed for high rates of acceleration and therefore will function well in securing high speeds when schedules are revised as a result of transportation research.

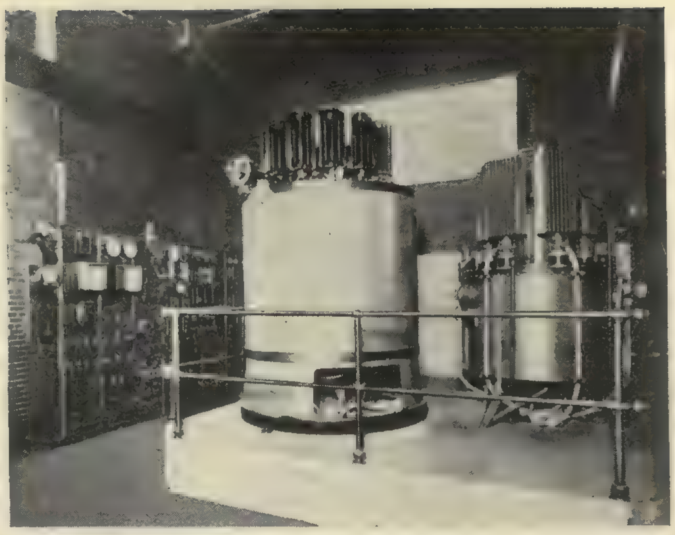
Cleveland pioneered the aluminum car for street railway use. It was built to demonstrate the durability of this material and that lightness could be obtained without sacrificing strength. The substitution of aluminum for steel reduced the weight of the car 12,900 lb., or 29.9 per cent. Its weight is 30,300 lb. as compared with 43,200 lb. Actual power saving per car-mile is 15.3 per cent. Aluminum was substituted for steel wherever possible. The superstructure, conduits, fenders, ventilators, couplers, trucks, compressors,



The purchase of new cars is a continuous policy in Cleveland



Interior view of aluminum car with which Cleveland Railway has been experimenting



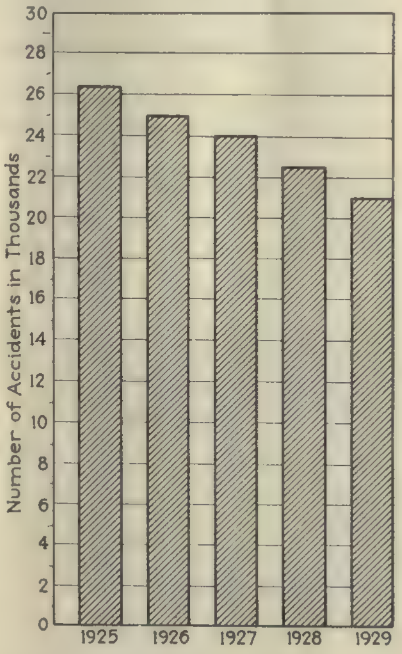
The Cleveland Railway is studying the mercury arc rectifier and its application to service conditions

brake cylinders, brake rods and bolsters were made of aluminum. Wheels, axles and motors, with the exception of bearing housings, remained steel. This car was put into regular service Jan. 1, 1927, and has been in constant use since that time, operating an average of 2,200 miles per month.

Recognizing the need for co-ordination of all transit facilities in the city of Cleveland and surrounding territory, the Cleveland Railway has co-operated with the rapid transit interests in developing a terminal plan around the public square. This plan will focus the principal industrial, business and banking activities at this central point and will provide an easy interchange of passenger traffic between main railroad trunk lines, the rapid transit system, the surface rail and bus system, taxicab service, private automobiles and pedestrians.

More riders and more revenue were obtained when the Cleveland Railway made a profitable substitution of a motor coach line for an unprofitable street car line. Flexibility of the motor coach not only permitted necessary rail abandonment, but also secured service extensions. This new express service from Cleveland Heights to Public Square, a distance of 7.92 miles, is attracting the previous user of the privately owned automobile. It is making a steady customer of a former occasional user of the Cleveland Railway Transportation Service. The earnings under the fare of 25 cents are averaging 30 cents per mile.

With the incentive to produce the very best service at the lowest possible fare and the lowest cost, the Cleveland Railway has continuously developed new equipment, machinery and methods. The automatic substation and remote control system first applied to metropolitan service in Cleveland has resulted in a continuous system power supply which has experienced no interruption on the system as a whole in over five years. This company not only conceived the idea of applying the automatic substation to metropolitan operation but actually specified and assisted in developing the equipment necessary for the operation and control. In the early development of a 60-cycle a.c. transmission system, there was no synchronous converter equipment available, and realizing the advantages of purchasing power from the existing 60-cycle central station rather than building a 25-cycle plant, the Cleveland Railway, after extensive investigation, undertook to design the first large capacity unit, namely, the 1,500-kw. size. With this machine they blazed the path for large capacity with 60 cycles. While it was a success from the start, the company has continued to improve its operation down to date.



Accidents are showing a steady decline in Cleveland

The possibility of applying the mercury arc rectifier to a metropolitan 600-volt power system has been carefully studied by the Cleveland Railway, and experimental installations have been made in co-operation with manufacturing companies. These experiments have included the application of automatic control, the super-imposition of remote supervisory control and the necessary changes to adapt the device to parallel operation with a synchronous converter in the same plant, and the development of means to overcome interference with telephone circuits. The original experimental units have now been replaced by the most recent development, consisting of a 500 and 1,000-kw. unit. As a result of these experiments, it is expected to ascertain how the mercury arc rectifier can be best applied to service conditions.

The Cleveland Railway has been a leader in the development of labor-saving machinery and equipment designed to reduce cost of operation. The shop, tracks and maintenance departments have all benefited from this progressive policy of developing new devices.

The Cleveland Railway has proceeded with its own safety program from an analytical standpoint to determine the basic causes of accidents, having in mind the establishment of safe practices without affecting speed Reduction of costs of injuries and damages has been the result of this study. In addition to this encouraging financial success, the extensive first aid instruction has caused the employee to sense the economic aspects of accident prevention. All transportation accidents show a study. In addition to this encourag- last five years.

Because it recognizes that profitable public relations depend largely upon the trainmen, the Cleveland Railway has centralized all industrial relation functions such as job analysis, selection and training of employees, accident prevention, public relation activities, suggestion systems, insurance and pension plans and welfare activities. This unusual centralization has resulted in an organized program of strengthening the trainmen's morale and inaugurating an intensive sales effort as a specialized activity of the company's personnel department.

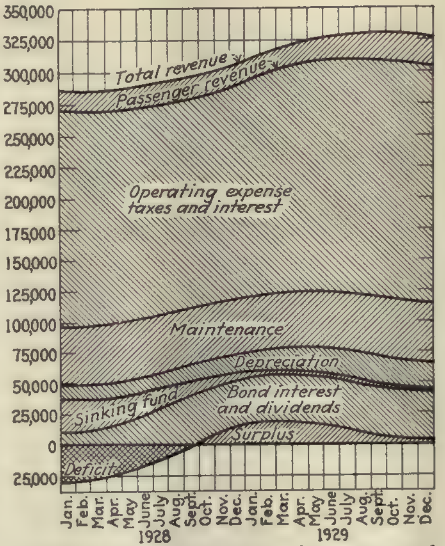
Other results have been improved employee relations, and the process of the employment interview, together with its public relation phase; standardized grading of applicants; standardized ability tests, and subsequent training. The aim is the training of specialized salesmen to enter a highly competitive market in which the company has at stake a million sales per day.

Services Modernized and Co-ordinated in Toledo

SUCCESSFUL co-ordination of street car and bus operations, permitting the extension and improvement of service with little new capital, is submitted by the Community Traction Company as its outstanding accomplishment in 1929. An increase in riding of 5.25 per cent and of passenger revenue of 5.35 per cent in contrast to an increase in average of employment of only 2 per cent was gained on the basis of better service because there was no change in company fares and the present franchise permits no opportunity for trials of special ride-selling fares. That the company kept pace with this increased patronage is shown by the fact that there were nearly 1,000,000 more service-miles operated in 1929 than in the previous year, an increase of 11.62 per cent.

A terminal-to-terminal speed increase of 22 per cent was made possible largely by rescheduling various car lines after increasing the horsepower per car from 70 to 140 and by rearranging the stops. This result was obtained during the greatest street reconstruction program in the history of Toledo.

Bus service was developed to a high degree with special attention to peak-hour industrial short-cut routes, schools, replacement of steam shop trains, door-to-door delivery of night workers, extensions to outside industries, guaranteed operation for suburbs and chartered service.



Two-year moving averages of revenue and expenses show progress in Toledo

The reduction in railway route mileage and the remarkable rise in motorbus routes does not in any way indicate the early demise of Toledo's street cars. Proper co-ordination of these services has strengthened the operation. The trunk line street car routes, particularly on the wide improved streets, have been rejuvenated to carry still heavier loads. On the other hand, the bus has been used to replace the slow, weak-traffic, single-track routes of narrow streets, to take up the loads of the non-competitive portions of old duplicative routes, to develop new crosstown routes for expanding and relocated industries, to serve as feeders and "owls" of street car routes and finally to create a variety of chartered daily and casual services made possible by the flexibility of the bus.

Traffic studies and new scheduling practices have resulted in better use of mileage. Former practice provided a certain number of base vehicles to run from 5 a.m. to midnight. Additional service was provided during the intervals, from 5 a.m. to 9 a.m. and from 3 p.m. to 7 p.m. This arrangement gave too much service just before and after the peak, yet not enough service at the peak.

A definite humanizing of employee relations has been continued during 1929. Comfortable working quarters and shopmen's uniforms have been supplied. Athletic and musical organizations have been fostered and economic matters, such as the treatment of veteran employees, of the superannuated, sick and injured, and of the families of deceased workers, have been furthered. All this work was done with the restriction imposed by the service and cost operation of a union property.

Two renewals of wage agreements have been made—the first in June, 1928, with no changes in wages except adjustments for some shopmen, and the second in June, 1929, when trainmen's wages were raised 2 cents an hour plus 1 cent an hour additional to each man who has a "No Accident" month. Further evidences of proper relations between management and employees are found in the growth of one-man operation and the selection and retraining of electric operators for bus service.

All financing, with the exception of the five-year way reconstruction program, has been done out of the earnings and on unsecured loans from local bankers. One of the most notable examples has been the fact that the extensive motor bus development of Toledo has been built up without any new capital. Buses are acquired on a rental basis, involving monthly payments over a period of years. Thus the buses can and do, in their entirety pay for themselves directly out of their earnings. The only buses that appear in "plant accounts" are those taken from the independents. Profits from operations which comprise any money remaining after expenses and rentals are assigned to "general surplus." To this "general surplus" will also be assigned whatever turn-in value the buses may have.

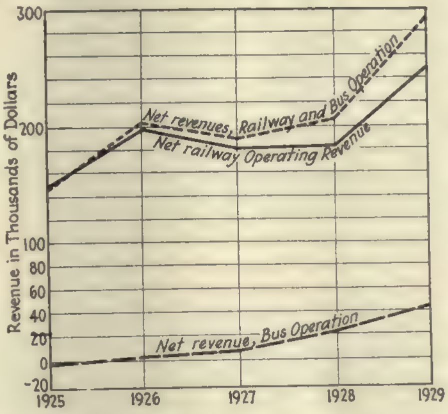
Gross and Net Increased by Eastern Texas Electric Company

POSITIVE evidence of progress, written in terms of greater gross and net revenue, is given by the Eastern Texas Electric Company in a statement of accomplishments for 1929. Serving a total population of approximately 116,000, this company furnishes street car and bus transportation in the cities of Beaumont and Port Arthur, Tex., and operates an interurban car line between them.

Local transportation has been furnished by the Eastern Texas Electric Company in Beaumont since 1912 and interurban service to Port Arthur since 1913. The successful operation of these systems, together with their progressive attitude in civic affairs, has built for them an enviable reputation. This reputation led the citizens and business interests of Port Arthur, acting through its city administration to petition the Eastern Texas Electric Company to take over the failing system in that city.

After a very thorough investigation of the situation, this property was purchased and a program of complete rehabilitation put into effect. Within the short course of slightly more than a year a property with worn out tracks, patched-up network for overhead, junk for rolling stock and ill-will instead of good-will was rendering a modern service and was put on a sound operating basis. The results speak for themselves. Gross revenues were increased from $6,023 in February, 1928, the first full month of operation, to $21,397 in December, 1929. In this latter year the property made a net earning of 16.8 per cent on the capital invested.

Accomplishments on the property as a whole, considering the two local services and the interurban line, can further be told with more figures on net revenue. Operating revenues for the year 1929 have been increased 18.8 per cent over the preceding year, while operating expenses only increased 8.2 per cent. Net revenues after taxes show the remarkable increase of 65.5 per cent. The railway department increased operating revenues 13.1 per cent, while increasing the expenses only 1.8 per cent. Net revenues in this department were increased 37.8 per cent over 1928. The bus division likewise showed a substantial increase in operating revenues amounting to 48.9 per cent with increased operating expenses of only 38.9 per cent. The net bus operating revenues are 80.7 per cent higher than in 1928. Since 1925, earnings in the railway division have increased 2.11 cents per car-mile, while operating expenses were decreased 1.37 cents per car-mile, leaving an increased net rate per car-mile of 3.48 cents.



Efficient operation and aggressive merchandising have resulted in greater net revenues for the Eastern Texas Electric Company

Operation of buses began on this property in 1924, and showed a net loss of 8.76 cents per bus-mile. In 1929, this figure had been turned to a net profit of 6 cents per bus-mile. Earnings on invested capital in 1929 amounted to 10.2 per cent. Net income was increased $88,625 in 1929 over 1928, and this increase amounts to 6.8 per cent on the corporate capital stock.

The company's invested capital account increased $467,000 since 1926 and this includes the funds necessary for acquisition and the improvement of the Port Arthur property. The capital for this expansion was secured through temporary borrowings and all but $145,000 has been repaid out of earnings. Net additions to invested capital accounts during the past three years were returned in a period of eighteen months on the basis of 1929 operating revenue. Net additions to invested capital accounts during 1929 were returned by increased operating revenue in a period of 6.4 months. In addition to repaying a substantial proportion of the money borrowed for expansion, the company has paid stock dividends at the average rate of 6 per cent yearly.

Confronting the Eastern Texas Electric Company in 1929 was not the problem of rebuilding a rundown property or of building up good will which had been destroyed, but rather a problem of increasing a patronage that had in the past been gratifyingly satisfactory and of improving public relations that, throughout the long history of the company, had been above average. This problem could only be solved by thorough and efficient merchandising. Modernization of equipment as well as that of tracks and their maintenance played an important part in this program. That the rolling stock was kept in good operating condition is attested by the fact that the railway equipment during 1929 operated 52,400 miles and the buses 3,332 miles to every pull-in.

As a requisite to success in merchandising the service, the operating personnel took a place of equal importance with modern equipment and convenience, locations of lines and adequate schedules. The company's policy is to employ platform men who are not over 28 years of age. They are carefully selected and trained not only in the work which they are to do but as salesmen of the company's service. The men are urged to live in different portions of the city for the possible good to be attained through association in scattered neighborhoods.

Modern equipment is used on city and interurban lines in Beaumont and Port Arthur, Tex.

Round-Table Discussions Held on Many Subjects

Ten luncheon conferences were held at the San Francisco convention of which three were in connection with the work of affiliated bodies. The other seven were on general topics. Much valuable discussion developed at all of them. Brief reports are given below or elsewhere in this issue.

Relief of Street Traffic Congestion

NEED for scientific methods of locating traffic signals and the effects of parking regulations were the principal subjects discussed at the luncheon conference on "Relief from Traffic Congestion." In the absence of G. A. Richardson, E. J. McIlraith, Chicago Surface Lines, led the discussion.

R. T. Dorsey, city traffic manager, Los Angeles, questioned the possibility of setting up a minimum standard code for the location of traffic signals based on the number of vehicles passing a given intersection.

Some divergence of opinion was evident on the subject of manual operation of traffic signals by police officers. Mr. McIlraith held that manual operation is never as satisfactory as properly timed automatic control, while E. L. Byington, chief inspector Market Street Railway, San Francisco, stated that local conditions have sometimes made necessary manual control on Market Street during peak-load periods.

In reply to an inquiry by E. C. Mitchell of the Los Angeles Retail Dry Goods Association, Mr. McIlraith summarized the history of no-parking legislation in Chicago and pointed to the present agitation for parking restriction on the part of merchants on Milwaukee Avenue as concrete evidence that the parking ban in the central business district has proved its merit.

E. F. Thayer, St. Louis Public Service Company, pointed out the real service which local transportation people can render to the downtown merchants of their communities by working to convince them that their own ultimate salvation lies in taking a constructive attitude toward the street traffic and parking problems. He indicated the analogous situation between the former adverse attitude of merchants toward the by-passing of through traffic and the present unwillingness to listen to suggestions that curb parking in front of their stores be eliminated and the streets reserved for traffic movement rather than used for garaging space.

The advantages of staggered office and store hours and the merits of taxicab stands as compared with unlimited cruising were also discussed.

Others taking part in the discussion were R. T. Dorsey, city traffic manager of Los Angeles, Ralph Robinson, manager of the San Francisco Traffic Survey Commission, and James Davis, deputy chief of police of Los Angeles.

Fare Structures

SUMMARIZING the present situation on fare structures, A. S. Richey, Worcester, Mass., who presided at the luncheon on this subject, pointed out that flat fare increases have not proved entirely satisfactory. However, while exact theoretical fare structures could be worked out it would be impossible to put them in practice. There are three difficulties, he said, which prevent exact fare systems working: to determine the exact fare due from each individual passenger; to collect the fare without slowing up the service; and to audit it. When and if such problems can be solved, the proper fare structure will be in sight. In the meantime, many interesting experiments in fare structure are being made.

J. G. Hunter, transportation engineer California Railroad Commission, felt that if a 5-cent base fare is retained it is necessary to go to zones. He has grave doubts as to whether high fares will do any good, at least under conditions existing in California cities.

G. H. Binkley, Market Street Railway, San Francisco, stated that on his property, while the 5-cent fare is not satisfactory as a revenue producer, he questions whether an increased fare would be helpful. A. S. Tilestone, Key System Transit Company, Oakland, stated that his company is now charging 7 cents, excepting that an all-day pass is used on Sundays and holidays. This has proved profitable, he said, and has brought in some additional revenue. Frank Karr, Pacific Electric Railway, Los Angeles, mentioned various changes made in fare rates.

H. S. Dixon, San Diego, said that the fare structure in that city features two city zones, inner and outer. In each there is a 5-cent flat cash fare with tokens good for two zones sold at the rate of four for 30 cents. Some of the suburban routes have as many as ten zones with a fare of 5 cents in each and with reduced rate tickets. There also is a weekly pass on the system sold for $1, which is good in either inner or outer zone, and a school pass restricted to school districts. The pass, he said, has made possible one-man operation, as it is used by one-third of all the passengers.

W. W. Holden, San Antonio, described the service zoning in that city. All street car lines are cut off at a 3-mile radius from the center. There is a second zone 1½ miles wide outside of that and other zones are beyond. In the outer zone, buses are operating which run express through the inner zone. This automatically segregates the passengers into social groups, which he has found helpful. The service is speeded up in the outer zones about one-third. It has made it possible to give improved service without increase in equipment.

R. E. Moody, Milwaukee, discussed the new fares in effect in that city. These include 10 cents cash with reduced ticket fare and pass. The pass, he said, is well liked. In St. Louis there is a modified permit plan. A card good for twelve rides is sold for $1. This is punched by the conductor each time a ride is taken, and after it has been punched twelve times it is accepted on payment of 5 cents a ride.

L. R. Nash, Boston, summarized the discussion. He indicated that with service such as that given in San Antonio it is necessary to have a sufficient demand to give reasonable headways in each zone. The nickel permit, he believes, has advantages over the weekly pass, in that it distinguishes between casual and regular riders.

Employees Relations and Trainmen Conference

AN ACTUAL trainman's conference with thirteen motormen and conductors, under the direction of T. A. Bragg, superintendent of training and employment, Market Street Railway, San Francisco, was held before approximately 60 delegates at the luncheon on employee relations. The trainmen represented employees who had been in street railway service from 8 to 29 years. The total number of years represented by the entire group was 231. Mr. Bragg announced to the group that the subject for their consideration would be, "Interesting the Customer." The men, asked to analyze this subject, took up the various elements in obtaining more rides from the public.

A further question was asked the group about getting back the rides that have apparently been lost due to automobile and other competition. It was unanimously agreed by these representative trainmen that they should go out and solicit new business. Door-to-door canvassing and merchandising methods were discussed.

Following this demonstration, Edward Dana, general manager Boston Elevated Railway, sponsor for the luncheon, expressed his appreciation of the conference held and told of similar methods of employee contact being carried out in Boston.

Transportation Problems of the Small City

IMPROVED and intensive merchandising methods, accompanied by the best possible service that can be rendered, are the greatest needs of the transportation systems in small cities, according to those who gathered for this conference, which was in charge of F. L. Butler, vice-president Georgia Power Company.

In his opening remarks, Chairman Butler emphasized the importance of the small-city problem and the necessity for taking immediate steps to place them on a sound operating and financial basis. "Any community," he stated, "that expects to expand and prosper necessarily requires some form of dependable and economical public transportation."

The report of the committee on small-city operation, not presented at the regular T. & T. sessions, was read at the luncheon conference by Mr. Butler. The report is summarized elsewhere in this issue.

In the discussion which followed, the subjects of bus substitution, transferring from car lines to feeder buses, selling the service, employee sales campaigns, radio, new equipment, one-man operation, public relations, fares and market surveys were covered.

Those who participated included C. B. Short, Roanoke Railway & Electric Company; John H. Pritchard, Central Public Service Corporation; E. W. Florence, Pacific Gas & Electric Company; A. C. Bradley, Pacific Electric Railway; W. N. Clark, Southern Colorado Power Company; W. H. Heun, Chicago & Joliet Electric Railway; Maxwell E. Benson, Nashville Railway & Light Company; R. E. Plimpton, White Company; and A. H. Gossard, Middle West Utilities Company.

Interurban Management and Operation

DISCUSSION at the round-table luncheon on interurban management and operation, sponsored by D. W. Pontius, centered around plans for recovering the transportation business lost by electric roads. Of particular interest was the discussion of the store-door pick-up and delivery system inaugurated by the Pacific Electric Railway in southern California a year ago. Under this plan the railway company contracts with trucking agencies at terminals and important stations along the line to perform the pick-up and delivery service. Mr. Pontius stated that this service has doubled their business without loss of their former traffic.

It was the consensus of opinion of all those who discussed this important subject that store-door delivery offers the most promising solution.

Development of Cars and Equipment

GOOD vehicles are essential to good public relations and there is no more important problem before the electric railway industry today than the development of improved cars. Unanimous agreement on this point was evident from the discussion at the "car development" luncheon under the sponsorship of Dr. Thomas Conway, Jr., president Cincinnati & Lake Erie Railroad. He stressed the need of organizing the mechanical men of the industry to secure the benefit of their ideas and experience in the work of the President's Conference Committee. The electric railway as a business undertaking cannot survive unless it can be put on a profitable basis, he said, and the key to the situation is the electric railway car.

Enthusiastic support of the program of the committee was expressed by C. C. Vargas, Key System Transit Company, Oakland, Cal.; J. M. Yount, Market Street Railway, San Francisco; E. B. Meissner, St. Louis Car Company; George Frey, J. G. Brill Company, and C. E. Morgan, Cincinnati Car Company. Mr. Meissner also emphasized the importance of developing methods of financing new car purchases. Prof. D. D. Ewing, Purdue University, prophesied that much good would result from the concentrated research work now being undertaken. Recent experience with new cars in Chicago was outlined by H. H. Adams. That people can be induced to ride only by making the vehicles attractive was the opinion expressed by G. J. Shave, of the London General Omnibus Company.

In connection with the problem of improving rolling stock, a lively discussion occurred concerning depreciation reserves and their effect in making possible the purchase of new cars. W. G. Rennison, Petaluma & Santa Rosa Railroad, spoke of the difficulty which many railways have in setting up adequate depreciation reserves and doubted that it would be possible to depreciate new cars on the basis of a ten-year life as has been suggested. Richard Sachse, Key System Transit Company, and Dr. Conway expressed the opinion that the railways would be allowed to set up depreciation on the basis of the actual useful life of equipment regardless of whether it was more or less than ten years.

Co-ordinating the Taxicab

THAT there is a place and a need for taxicab service which should be furnished by the existing transportation companies provided adequate legislation is enacted was the conclusion reached at a luncheon meeting under the sponsorship of J. B. Stewart, Jr., of the Cincinnati Street Railway.

Electric railway traffic has been seriously affected by the increasing use of taxicabs, particularly in certain cities where the cut-rate taxi business has developed into a situation resembling that created by the jitneys some ten years ago. Mass transportation agencies should be protected against unfair competition of this character, he said.

F. W. Doolittle, of the North American Company, suggested that the railways have been making a mistake in failing to recognize the demand for other classes of service than that rendered by their mass transportation vehicles. O. C. Mills, Key System Transit Company, contended that electric railways cannot go into the taxicab business until more adequate regulation is enacted. The bad effects of low-rate taxicab operation in Columbus, Ohio, were discussed by M. L. Evans, Columbus Railway, Power & Light Company. He said, however, that the general public and the merchants are now beginning to resent the manner in which these cabs are congesting the streets. Conditions in Cincinnati were described by Mr. Stewart.

Development of Buses and Trolley Buses

INTEREST in rail-less transportation centered around a discussion of design, construction, reliability of service, and the riding comfort of the different types of vehicles available at the luncheon meeting on "Development of Buses and Trolley Buses," sponsored by E. A. West, Salt Lake City.

Particular attention was given to the features of trolley bus design and operation, especially the high rate of acceleration and retardation and the effect on tire life, which was said to be negligible.

Trolley bus operation was held to be more economical than that of gas buses as the saving in energy costs, even on a fifteen-minute headway, was sufficient to meet the cost of erecting the overhead wires.

In the discussion of motor buses, trouble from gas fumes was held to be one of the biggest complaints. This difficulty was attributed both to design and to the fault of the fuel refiner.

Small-sized buses—those of 21-passenger capacity—were cited as being of especial value for fast schedules and that speed depended on number of stops necessary to handle the traffic. With twenty seconds as the time for taking on and discharging a passenger, schedule speeds are slowed down in direct proportion to the capacity of the bus operated. Thus if 21-passenger buses can make a schedule in 30 per cent less time the cost per seat-mile will be about the same for both buses of large and small capacity. This higher speed is of real sales value. In San Antonio, it is said, complaints are now being received from automobile drivers that buses travel so fast they cannot be passed.

Comments were also made relative to the high cost of replacement parts for some types of units used on buses, of the necessity for providing greater accessibility of parts for proper maintenance and more simplicity in body construction in order to lower maintenance costs.

Claims Luncheon

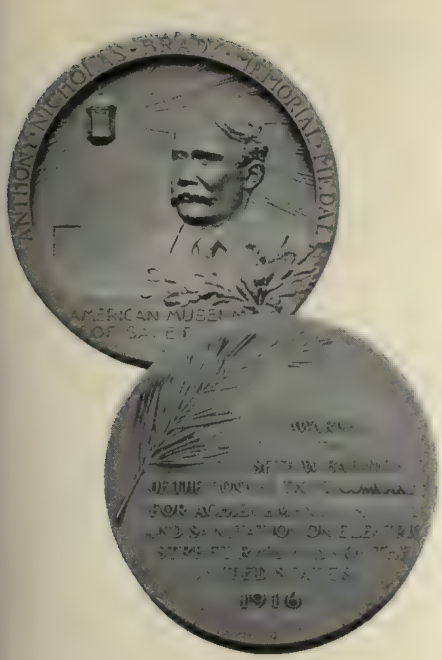
MATTERS involving the handling of claims were discussed in detail at this conference, in charge of B. F. Boynton, advisory claim agent of the Northwest Public Service Corporation, and president of the Pacific Claim Agents Association. Most of the discussion concerned the ambulance-chasing evil which is now so prevalent throughout the country. This subject has been before the Claims men in the past in a notable series of presentations, and evidence of real progress toward curbing the evil was furnished. In New York particularly has success attended efforts to curb the "shyster."

A feature of the luncheon was a paper on "The Psychology of Accident Prevention," read by L. H. Rodebaugh, Sacramento Northern.

Among those who participated in the discussion were W. H. Renaud, Jr., New Orleans Public Service, Inc.; J. H. Dennis, Seattle Municipal Railway; L. H. Butterworth, Boston Elevated Railway; Ray Taylor, Municipal Railway of San Francisco; Earl E. Grover, Columbus Railway, Power & Light Company; Paul W. Klabunde, Milwaukee Electric Railway & Light Company, and S. A. Bishop, Pacific Electric Railway.

Temple Square, Salt Lake City

Mormon Temple and Tabernacle where delegates on Red Special Train listened to daily organ recital


ANTHONY NICHOLAS BRADY MEMORIAL MEDAL
AMERICAN MUSEUM OF SAFETY
1916

Brady Awards

Won by

Duluth, Colorado Springs, and Lethbridge Railways

Contest based on accident statistics for 1929 submitted on the association's standard report form. Records of more than 200 companies considered

ANNOUNCEMENT of the winners of the 1929 Anthony N. Brady Awards and the presentation of medals and certificates were made at the convention of the American Electric Railway Association held in San Francisco, June 23-26, 1930. The Class A prize was won by the Duluth Street Railway, Duluth, Minn., with honorable mention going to the Ottawa Electric Railway, Ottawa, Canada. In this class, 54 companies operating 5,000,000 or more car and bus-miles annually, submitted their accident statistic reports, which were analyzed for this contest. In Class B, including companies operating from 1,000,000 to 5,000,000 car and bus-miles annually, the first prize was awarded to the Colorado Springs & Interurban Railway, Colorado Springs, Col., with honorable mention to the Calgary Municipal Railway, Calgary, Alta., Canada. Seventy-nine companies competed for this prize. In Class C, including companies operating less than 1,000,000 car and bus-miles annually, the Lethbridge Municipal Street Railway, Lethbridge, Canada, and the Montana Power Company, Missoula, Mont., won the first award and honorable mention respectively. Sixty-eight companies were represented in this class.

Members of the American Museum of Safety and the American Electric Railway Association formed a joint committee to select the winners of these awards. They were Lewis Gawtry, president of the Bank for Savings, chairman; Colonel A. B. Barber, manager of transportation and communication department, U. S. Chamber of Commerce; James H. McGraw, chairman of the board, McGraw-Hill Publishing Company, Inc., and Charles Gordon, managing director, American Electric Railway Association. The awards are a memorial to the late Anthony N. Brady, and are presented each year for the best records of safety made by electric railways in the United States or Canada.

Contest winners this year were determined on a different basis than those of previous years. Heretofore, the actual accident record of the contestant was considered as only 50 per cent of the total scoring. Other factors making up the remaining 50 per cent included: success in gaining good will through efforts or improved safety conditions; open-mindedness in applying original ideas and new developments, originating with others, as to safer operating methods and equipment; reduced maintenance or greater reliability of service resulting from improvements in safety practice; co-operation between management and employees in safety promotion; outstanding accomplishments in measures to promote sanitation and health. Briefs setting forth these factors of accomplishments and the methods by which they were obtained were required from the contestants.

In order to have more companies represented in the contest, the committee decided to change the basis on which the awards would be made. This year the companies submitting their accident statistics were rated according to the number of injuries and number of fatalities reported for the year 1929, the relative rating being 2 to 1—that is, each fatality counted twice as heavily against the company as an injury. The reports used for the committee's analysis were those submitted by the railways on the forms of the American Electric Railway Association. Companies were also invited to submit briefs during the year's contest, so that in case of a tie the briefs might be referred to for further data.

Analysis of the 200 accident statistics reports, which represent a large portion of the electric railway industry, impressed the committee with the degree to which the practice of safety has been developed by the electric railways of the country. How many lives have been saved by this intensive safety work it is impossible to estimate, but undoubtedly the number is very large.

Some idea of it may be gained from the fact that while the volume of traffic handled by street railway companies was about the same in 1929 as in 1920, the number of electric railway fatalities has been reduced from 2,124 to 1,600. This is the more striking in view of the 187 per cent increase in motor vehicle registrations during that period, with its consequent increase in street and highway congestion and an increase in all street and highway fatalities from 17,055 in 1920 to 33,060 in 1929. The electric railway record is one of the few bright spots in the discouraging story of constantly increasing traffic accidents.

The electric railway figures quoted above cover all electric railway fatalities including pedestrians, occupants of automobiles, employees, passengers and others. When the figures on passenger fatalities are examined—fatalities to the people who trust their safety to the street railways—the record is remarkable. The statistics show that only one passenger out of each 300,000,000 carried is killed. That means that the equivalent of more than two and one-half times the population of the United States is regularly transported on the street cars of the country with the loss of only one life.

For the Class A award, the Duluth Street Railway and the Ottawa Electric Railway ran a very close race. Their properties are similar in that each operates both city and interurban service. The Duluth company operates 111 cars and eleven buses, a total of 122 vehicles, while the Ottawa company operates 115 cars and ten buses, a total of 125 vehicles. In Duluth a total of 5,461,671 miles were operated, of which 4,716,050 were car-miles and 745,621 were bus-miles. As compared to this, Ottawa Electric Railway operated 5,149,246 miles, of which 4,716,490 were car-miles and 432,756 were bus-miles.

The accident record submitted by these two companies and the scoring of points against each, as explained above, is as follows:

	Duluth St. Ry. Duluth, Minn.	Ottawa Electric Ry. Ottawa, Canada
Number of fatalities, 1929		
Railway	2	3
Bus	0	0
Total	2	3
Number of injuries, 1929		
Railway	124	100
Bus	12	13
Total	136	113
Number of fatalities per 1,000,000 miles		
Railway	0.42	0.64
Bus	0.00	0.00
Total	0.37	0.59
Number of injuries per 100,000 miles		
Railway	2.63	2.12
Bus	1.61	3.00
Total	2.49	2.19
Score for fatalities		
Railway	6.72	10.24
Bus	0.00	0.00
Total	5.80	9.38
Score of injuries		
Railway	21.04	16.96
Bus	12.88	24.00
Total	19.93	17.55
Total score	25 73	26.93

	Colorado Springs & Interurban Ry. Co. Colorado Springs, Col.	Calgary Municipal Ry. Calgary Alta., Canada
Number of fatalities		
Railway	0	0
Bus	0	0
Total	0	0
Number of injuries, 1929		
Railway	4	16
Bus	0	..
Total	4	16
Number of fatalities per 1,000,000 miles		
Railway	0	0
Bus	0	..
Total	0	0
Number of injuries per 100,000 miles		
Railway	0.30	0.52
Bus	0	..
Total	0.27	0.52
Score for fatalities		
Railway	0	0
Bus	0	..
Total	0	0
Score for injuries		
Railway	2 40	4.16
Bus	0	..
Total	2.16	4.16
Total score	2.16	4.16

Class B contestants, those operating from 1,000,000 to 5,000,000 car and bus-miles annually, were led by the Colorado Springs & Interurban Railway, a company operating city and interurban service, while the Calgary Municipal Railway received honorable mention. The Calgary company operates only city service. A comparison of equipment and miles operated between these two companies is as follows: Colorado Springs company operates twenty cars and three buses, while the Calgary company operates 81 cars and no buses. In Colorado Springs, a total of 1,493,024 vehicle-miles were operated during 1929, of which 1,341,137 were car-miles and 151,887 were bus-miles. The Calgary Municipal Railway oprated 3,070,251 car-miles. The accident records with respect to injuries and fatalities together with the corresponding score for place, are as set forth in detail in the table at the left.

In the third group, or Class C, the Lethbridge Municipal Street Railway operates city service only, while the Montana Power Company operates city and interurban service. In Lethbridge five cars operated 253,064 miles during 1929 while the Montana Power Company operated nine cars over 440,663 miles. Their statistics and ratings are shown in the following table:

	Lethbridge Municipal St. Ry., Lethbridge, Canada	Montana Power Co., Missoula, Mont.
Number of fatalities, 1929	0	0
Number of injuries, 1929	0	1
Number of fatalities per 1,000,000 miles	0	0
Number of injuries per 100,000 miles	0	0.23
Score for fatalities	0	0
Score for injuries	0	1.84
Total score	0	1.84

Colorado Springs and Pike's Peak

The delegates on the Red Special had an opportunity to see the Peak and inspect the property of the Colorado Springs & Interurban Railway

T. & T. Studies

Industry's Fundamental Problems

THREE interesting meetings were held by the American Electric Railway Transportation and Traffic Association at the San Francisco convention. They were attended by a large group which participated actively in the program with discussions, both prepared and extemporaneous. Consideration was given to five committee reports—the transportation employee, movement of the vehicle, operating economics, the passenger and equipment. The sixth report, on small city operation, was read at a luncheon conference.

In the absence of Samuel Riddle of the Louisville Railway, president of the association, Paul E. Wilson of the Cleveland Railway, first vice-president of the association, took charge of the meetings.

The presidential address of Mr. Riddle was presented at the opening of the first meeting by George B. Anderson of the Los Angeles Railway. Mr. Riddle referred to the interesting early history of the T. & T. Association and pointed to the progressive steps it has taken leading up to the present.

"The Transportation and Traffic Association," Mr. Riddle stated, "while the youngest of the affiliated bodies of the A.E.R.A., has made valuable contributions to the industry through the study, research and deliberations of its many committees. The industry's very life depends on the major problem that confronts us today, the diminishing number of riders. We are scarcely maintaining the number of passengers heretofore carried economically and are not receiving the benefits that might be expected to accrue from constantly increasing population. Our plants generally have been estimated to keep pace with the improvements in the arts and sciences, but we do not find a proportionately augmented demand for the service we are capable of rendering. We are challenged today by more private automobiles than ever before. The result of their existence not only is a decrease in the use of mass transportation and an ever-increasing traffic congestion, but our service also is made less attractive to our patrons because we are unable to attain the highest rates of speed possible through the use of modern equipment."

Samuel Riddle
President

Mr. Riddle commented on the subjects selected for committee study during the past year and praised the work of the selected groups.

The report of the transportation employee committee, of which Clinton D. Smith, Cleveland Railway, was chairman, was presented by Jeff L. Alexander, Houston Electric Company. Special attention was given to an analysis of the transportation job with the correlated subsequent supervisory and employee training and a study of proneness to accidents. Each of these subjects was broken down in the report and the individual parts thoroughly analyzed.

Comments upon the report submitted by Prof. Henry H. Norris of the Boston Elevated Railway were read by the chairman. Professor Norris listed six fundamental considerations with respect to the employee. Intrusting the selection to the highest possible type of men, stressing the quality of the contact man, instilling the sales instinct in the men and discouraging snap judgment, analyzing the mental and personal qualifications, and applying psychology. He commented on the advantages in psychological study for the reduction of accidents and indorsed the usefulness of the supervisory conference plan for supplemental training. He also referred to the early work of the association in solving this problem, and pointed out that increasing benefits are accruing from continued research.

A. T. Mercier, Pacific Electric Railway, pointed out that although the present policy of studying past records of employees and then improving them is necessary, more attention should be paid to the proper selection of candidates for positions. He recommended the use of efficiency tests for the classification of employees into groups according to their weaknesses and paying especial attention to each class. "Leadership, discipline, rewards, and remedies," stated Mr. Mercier, "are necessary for developing the most efficient type of personnel."

In support of Mr. Mercier's comments, R. B. Hill, Los Angeles Railway, further emphasized the need for finding competent men. He urged that more money be spent to select men and that the electric railways make their working conditions attractive to the proper type of men. He also pointed out that care should be taken in selecting and training men for departments other than the transportation department. In concluding, he advised that department heads gain the confidence and support of their men through frequent, personal contacting.

An interesting comparison was made by Leslie Vickers, economist of the association, of the sales possibilities for the electric railways and the other public utilities. He pointed out that in the case of the telephone, electric lights and gas, a favorable impression is made upon the public through physical equipment. In contrast to this, he said, the product of the electric railway is dispensed solely by the men on the vehicles. Therefore, their contacts vitally influence the impression of the public. "The transportation employee," Mr. Vickers stated, "needs to know, first, his job; second, the product that he is selling; and third, the people to whom this ride is sold." In analyzing this third point he suggested that employees make a study of patrons, since it is to human beings that the service is being sold.

The second report of the day, movement of the vehicle, of which C. W. Wilson, Pittsburgh Railways, was chairman, was presented by E. J. McIlraith, Chicago Surface Lines. Mr. McIlraith analyzed all of the important sections of the report and commented extensively on those phases which he considered were of greatest interest to the association. Four subjects were covered in the report: the private automobile, the parking problem, signals and traffic control, and equipment.

Mr. McIlraith, in reviewing the parking problem section, restated the general principles that first, parking is a privilege and not a right; second, parking may be tolerated and should be permitted where it does not interfere with the right of the general public to use public ways for travel purposes; third, where parking is permitted it should be regulated in such a manner as to promote safety, a minimum of interference with travel uses, and an equitable distribution of curb space available among operators of vehicles who desire to park; and fourth, where parking interferes with essential travel uses the privilege should be modified, or if necessary, withdrawn.

Some valuable points on making traffic studies were added by Mr. McIlraith in discussing the subject of traffic signals and control. He urged the proper application of signals, following detailed analysis of the requirements, and differentiated between speed and recklessness, in connection with the accident hazard. On the subject of equipment, he read the principal features of existing equipment which are most readily susceptible of improvement, and pointed out that with good equipment the most in the way of speed can be obtained through proper schedules.

A. J. Lundberg, Key System Transit Company, suggested the solving of the traffic problem on the basis of facts. He differed with an opinion in the report that "it is too early in the development of the automobile and facts are too inadequate to draw definite conclusions with respect to the ultimate competitive effects of the private automobile on collective transportation," stating that sufficient knowledge of the automobile's effects in cities of all population classes is available to make analyses of the problem and remedies. He urged that the railways take every possible step to meet the competition of the private vehicle and to rid themselves of a "bankruptcy complex" by keeping the physical plant in the neatest, brightest appearing condition. In concluding, Mr. Lundberg commented on the number of vehicles passing through a given intersection necessary to justify the installation of a traffic signal.

Following the president's address at the opening of the session, the reports of the executive committee and the secretary-treasurer were accepted. In the last report the procedure of the small city committee through the past year was outlined.

Officers for the ensuing term, as selected by the nominating committee, were approved by the association. They are:

President—Paul E. Wilson, vice-president and secretary Cleveland Railway.

First Vice-President—George B. Anderson, director of personnel Los Angeles Railway.

Second Vice-President—R. N. Graham, manager of railways Pennsylvania-Ohio Public Service Corporation.

Third Vice-President—F. L. Butler, vice-president, Georgia Power Company.

Secretary-Treasurer—Guy C. Hecker, general secretary American Electric Railway Association, New York.

Executive Committee—The officers and Adrian Hughes, Jr., superintendent of bus transportation United Railways & Electric Company of Baltimore; D. L. Fennell, general superintendent of transportation Kansas City Public Service Company; C. H. Evenson, superintendent of transportation Chicago Surface Lines; and William W. Holden, manager traction department San Antonio Public Service Company.

Wednesday Session

THE report of the committee on operating economics occupied the entire second session, held on Wednesday. The report, prepared under the chairmanship of Joe R. Ong, Cincinnati Street Railway, was presented by J. B. Stewart, Jr., of the same company. Mr. Stewart selected a number of the most interesting parts and concentrated on these. Five subjects were covered by the committee during the year, those operating practices which have resulted in an increase in gross revenue and those decreasing the cost for operation and maintenance, one-man cars, bus substitution, business-getting and fares. Under the first subdivision a number of practices beneficial to the railway were described.

Comments of the chairman, Joe R. Ong, were submitted by letter and read by Frederick C. J. Dell of the association. Mr. Ong confined his comments to appendices A and B, dealing with proposed methods of cost distribution to routes and classes of bus and electric railway service. He made a number of suggestions for the use of proper units in these proposed methods for the distribution of costs.

Stress was laid by C. L. Van Auken, Electric Traction, on the need of proceeding in this work on an analytical basis. He pointed out that added economies could be secured from further study and that increased revenue could be obtained with intensive research. He also spoke of the need for a scientific fare structure.

At this point, Carl W. Stocks, editor of *Bus Transportation,* was called upon to give observations of his trip by bus from New York to San Francisco. He gave some very interesting details of the 3,400-mile trip and outlined practices with regard to schedules, maintenance and terminal facilities of the long distance bus companies. He spoke favorably of the systematic maintenance and care of these vehicles, reflected by the fact that no serious trouble developed at any time.

"Co-operate with the accounting department in making a cost analysis," was the plea of H. E. Jordan, Los Angeles Railway. He stated that electric railways are handicapped greatly by the lack of satisfactory cost accounting systems and compared the railways as manufacturers of rides, to other large successful manufacturers having comprehensive accounting systems. He further pointed out the possibilities of improving the service and estimating the life of equipment through the securing of accurate and complete data and analyzing these intelligently.

Lester J. Turley, Los Angeles Railway, commended the report on operating economics, particularly the new ideas advanced in it. He told of the use of a manual of operating methods by his railway and told of the results obtained. He also spoke of making a passenger origin survey in Los Angeles and the employees' welfare work of his company.

Comments of A. T. Mercier, Pacific Electric Railway, were read by F. E. Geibel of the same company. He stressed the need for comprehensive analyses of practices and costs and stated that the possibilities with existing equipment should be studied first. Concluding, he suggested use of talking movies for advertising.

In answer to inquiries of how the Cleveland Railway adjusted its operating expenses following changes in the fares set-up, Paul E. Wilson explained the type of franchise under which the Cleveland Railway is operating and told of how the accounts are handled. He pointed out that in Cleveland the expenses force the adjustment of fares.

L. R. Nash, Stone & Webster Service Corporation, speaking on the subject of cost analyses, showed the need for a real study of costs so that new classes of business can be developed.

An interesting reflection on the public's reaction to the proposed substitution of trolley buses for gasoline buses was given by E. F. Thayer, St. Louis Public Service Company. He stated that much opposition was voiced to the change in St. Louis and concluded that, from the public's standpoint, the trolley bus occupied a midway position between the street car and gasoline bus.

Some interesting facts which were developed by the market survey made in Roanoke, Va., were related by Walter Jackson, consultant of Mount Vernon, N. Y. He analyzed the relative uses of the pass in the different hours of the day in two districts, one of these being a higher class district. He also spoke of the effect of the telephone and radio, as well as other factors which had an effect on the riding statistics secured in the survey.

The report of the committee on equipment, of which L. C. Datz of the St. Louis Public Service Company was chairman, was presented by F. L. Butler, Georgia Power Company.

In commenting on the report, C. E. Morgan, Cincinnati Car Corporation, stated that along with placing new equipment in service the railways must determine their markets and the needs of the people. He cited the experiences in Brooklyn of interviewing riders relative to new cars and how vital information which influenced future car design was obtained.

F. E. Geibel, Pacific Electric Railway, told of making several changes in car design and the results of these on the riding public. "All elements of car design," he said, "must be considered from the standpoint of rider appeal." He also spoke of the effect of new equipment in developing the interest of employees.

At the official closing of the convention, C. E. Morgan praised the work of President Samuel Riddle throughout the previous year and welcomed the new president, Paul E. Wilson, in behalf of the association.

Thursday Session

At the final meeting of the T. & T. Association, two committee reports were presented, those on the passenger and on equipment. The first was given by William W. Holden, San Antonio Public Service Company. Mr. Holden spoke of the high points of the report, explained the purposes of entering a new phase of study and outlined the procedure to be followed in making market analyses of certain properties. Briefly, the plan is to have Dr. W. J. Reilly, selected for this work, visit the properties for a short period and instruct the personnel in methods of making and analyzing a market survey. Certain parts of this work have been completed, but the plan has not advanced to a point where definite conclusions could be included. The purpose, as explained by Mr. Holden, is to obtain a real knowledge of the desires of the people as a whole for public transportation.

W. H. Lines, Pacific Northwest Public Service Company, spoke of the good results bound to result from market analyses and pointed out the many possibilities of such a survey in learning the attitude of the public, stimulating business and effecting service improvements. He compared the plan to similar efforts of successful manufacturers who produce a good product, develop suitable markets and then inaugurate intensive sales campaigns. Mr. Lines also touched on the franchise situation in Portland and the outlook of transportation in that city.

"Uniform market analyses," stated J. P. Potter, Key System Transit Company, "would be of real benefit to all carriers in the industry." He pointed out that surveys of this kind would show the managements what is lacking in equipment and service and would enable them to get the public and civic authorities interested in transportation. He also told of a house-to-house canvass, made by his company in Alameda, to determine what the people thought of the company and its service.

"Merchandising," stated O. A. Smith, Pacific Electric Railway, "is the basic principle of any business. The railways must recognize this if they are to increase their revenue." Determine what the public wants and then satisfy these desires, was the advice of Mr. Smith. He spoke at some length on the results of fare changes in Glendale and Pasadena, and indicated that by making surveys the results of these and other changes could be forecast.

Transportation Problem Outlined to Electrical Men

SPEAKING at a luncheon meeting of the San Francisco Electrical Development League at the Palace Hotel on Monday, Charles Gordon, managing director A.E.R.A., presented an outline of the local transportation problem and its relationship to general business. He pointed out that it would be physically impossible to provide individual transportation in congested districts for everyone who wishes to ride. In fact, it was the congestion caused by the use of individual vehicles more than 200 years ago in the streets of London that resulted in the inauguration of the first public transportation service. Today a tendency exists to think of the transportation problem in terms of vehicles rather than people. Such an approach to the problem is wrong, he said, as it is people, not vehicles, who do business. He pointed out that one four-track rapid transit line will carry more people than 25 express boulevards, and one double-track street railway line will carry more people than four express boulevards. It is essential that the relative carrying capacities of these different facilities be correctly appraised by the public if an effective solution is to be found for the local transportation problem.

Economics, Methods and New Designs

Studied by Engineers

APPLICATION of engineering practices to all phases of railway activity, with the aim of increasing the number of riders and catering to their comfort and convenience, was the principal subject of papers and discussions at the three general meetings of the Engineering Association in San Francisco. Contrary to the practice which has been adopted at the past several conventions, separate sessions were not held by the divisions of this association. Reports of the various committees were presented at the second meeting. At the third session, held on Thursday morning, the following officers were elected for the coming year:

President—L. D. Bale, superintendent of power Cleveland Railway.

First Vice-President—Charles H. Jones, general manager Chicago, South Shore & South Bend Railroad, Michigan City, Ind.

Second Vice-President—P. V. C. See, superintendent of equipment, department of railways, Northern Ohio Power & Light Company, Akron, Ohio.

Third Vice-President—E. M. T. Ryder, way engineer Third Avenue Railway System, New York.

Secretary-Treasurer—Guy C. Hecker, general secretary American Electric Railway Association, New York.

Executive Committee—The officers and W. W. Wysor, junior past-president, chief engineer United Railways & Electric Company, Baltimore, Md.; Howard H. George, superintendent of way Cleveland Railway; A. T. Clark, superintendent of rolling stock and shops United Railways & Electric Company, Baltimore, Md.; W. E. Bryan, superintendent of power St. Louis Public Service Company; and J. Fleming, purchasing agent Capital Traction Company, Washington, D. C.

President W. W. Wysor, of the Engineering Association, in his address urged the engineers to realize the responsibility which rested on them in all departments of the railway. He said in part: "We were faced during the war with a crisis no other major industry was called upon to bear—100 per cent increased operating expenses with little or no increase in fare. The engineers' answer was greater efficiency accomplished through numerous economies and the use of labor-saving machinery, as well as building better and more lasting structures. Machinery which was not used when labor was cheap was pressed into service with increased efficiency and better work.

W. W. Wysor
President

"With the economic limit of rate of fare already reached in many cases the question arises as to how we are to meet a keenly competitive situation which has now arisen and still keep our properties solvent. We must seek still further economies, more efficient methods and ways and means of increasing the number of riders. We must cater to that class of people to whom the difference between 10 cents and $1 means much; to the man who is becoming tired of the eternal pursuit of a parking space; to the mid-day shopper; to the person who is seeking just a little more in the way of speed, comfort and convenience. We must seek further relief from the burdens of taxation, which are unreasonable and unjust. We must seek for reduction in street congestion, especially unreasonable parking of private automobiles. In the hands of the engineer rests the secret of the solution of many of these problems."

Following the president's address a paper on "Electric Railway Special Trackwork" was presented by B. P. Legaré, engineer of maintenance-of-way and construction Market Street Railway, San Francisco. He reviewed the development of special track construction during the past 25 years and discussed in detail the modern construction of special work employing manganese and chrome nickel. "The problem of crossing design," said the speaker, "should be approached both from the engineering and foundry viewpoint, making full-size samples of numerous designs of crossing intersections and then subjecting them to destruction tests. The engineer must determine the direction of the forces acting upon the structure and then design a theoretical structure capable of withstanding those forces. The foundryman must examine the engineer's design and determine whether the theoretically designed sections can be made solid and without defects of other natures, for unless the metal sections are sound they cannot possess the properties ascribed to them by the engineer."

Regarding the question of what type of special work should be used by a company, Mr. Legaré said that there is no hard and fast rule. All kinds of conditions enter into the subject; the main ones being the amount of traffic, the cost, and in some locations pavement alone decides the type." Following the paper a discussion by members of the association brought out a comparison of the various advantages and disadvantages of manganese and chrome nickel steel structures.

Frank M. Harris, chief of the bureau of specifications and estimates, department of engineering, Pacific Gas & Electric Company, San Francisco, presented an interesting study on "The Relationship of Purchasing and Engineering."

"The Engineer and His Valued Influence in Western Development," was the subject of an address by A. T. DeForest, vice-president United States Steel Products Company, San Francisco. The speaker paid tribute to the engineers of the electric railway industry, as well as to other engineers and their work in developing the resources, transportation and general progress of the West.

A paper on the "London Omnibus and Other Forms of Passenger

B. P. Legaré

Transportation" was presented by George J. Shave, operating manager and chief engineer London General Omnibus Company, Ltd., London, England.

Mr. Shave made no attempt to compare conditions in London to those in our American cities when he advocated the general use of the bus rather than the street car. He pointed out how narrow streets, traffic congestion and short turns would be a handicap to successful electric railway operations in London. He stated that the 50-passenger double-deck, four-wheel bus seemed to be the solution of the transportation problem in that city. Mr. Shave told about the research work his company is carrying on with the heavy oil compression ignition type of engine. He stated that he believed an engine of this type will come into general use in the very near future. At present the London General Omnibus Company is operating about 100 buses in which Diesel engines have been installed.

The final paper of the first session, on the subject of "Economies of High-Speed Street Car Motor and Drive," was presented by C. Bethel, manager railway motor engineering department, Westinghouse Electric & Manufacturing Company. This paper was received with a great amount of interest by the delegates and brought forth some interesting discussions and questions. During the discussion, H. H. Adams, superintendent of shops and equipment Chicago Surface Lines, gave a valuable supplement to this paper by informing the meeting of the results so far obtained on his property with high-speed motors and drives. He confirmed Mr. Bethel's contention that the high-speed motor was here to stay and that its further development would be of great value to the industry.

Committe Work Reviewed in Two Sessions

Reports of the various committees of the Engineering Association occupied the greater part of the second and third sessions held on Wednesday afternoon and Thursday morning. For the most part, abstracts of the different reports were read before the sessions and, in a number of cases, were followed by active discussions. Particularly interesting discussions were held on several of the power committee reports and on the report which dealt with rail corrugation. On the latter subject a number of delegates told of their experiences with corrugation under various conditions and of the practice, which is becoming quite general, of grinding new rail immediately after it is laid.

The only paper to be presented at the second session was given by Lester S. Ready, consulting engineer of San Francisco. The subject of his paper was "Engineering Challenges of the West." Mr. Ready did not deal with engineering problems of the street railway, but very completely and interestingly gave the delegates a picture of California and the West in general from an engineering standpoint. He described the number of engineering problems which had been met during the development of California and also of projects which are planned for the near future. He dealt specifically with distribution of water, power transmission, and highway construction.

L. S. Ready

During the third and final session, a paper on the elimination of waste, prepared by A. S. Duncan, assistant director of finished stocks, Westinghouse Electric & Manufacturing Company, was read to the association. An abstract of this paper is published elsewhere in this issue. A second paper presented at this session, "Modern Vehicles and Equipment for Urban Transportation," was prepared by C. A. Burleson, transportation engineering department, General Electric Company, and read by L. Larson, San Francisco representative for the General Electric Company.

The closing acts of this association were to elect the officers for the coming year and to induct them into office.

Engineering Influence in Western Developments

Speaking before the Engineering Association, the author credited the engineer and the electric railways with the foresight that broadened areas of agriculture and industrial operations

By **A. T. De FOREST**

Vice-President United States Steel Products Company
San Francisco, Cal.

SINCE the days of '49 and the several succeeding years, during which immense wealth was taken from the mines and streams of California, rapid strides have been made in the direction of improved means of transportation and communication, also in the development of agriculture, industries, and transportation by both railroads and steamships. Railroads have been constructed and extended, and extensive highways provided for vehicular traffic to reach what were far distant and inaccessible sections, and there is more to follow. Along these developed lines of transportation, local improvements, communities and new industries have arisen.

In the development of manufacturing industries, the question of power was the important one. No coal of high quality was to be found, and the discovery of oil was yet to come. Therefore, the power in our mountain streams furnished a subject of study. With the long distance existing between the points of possible production of hydro-electric power, and the desired points of utilization of the same, it required able engineers to conceive, and bold promoters to finance, the projects to meet these conditions in the West. The first long-distance high-voltage transmission line in the world was constructed in 1891 in southern California by Prof. C. G. Baldwin. This engineering, constructing and financial genius laid the foundation for our great electric public utilities.

A. T. DeForest

The increase of population brought an urban and interurban transportation requirement, and the growth and breadth in agricultural development produced a like requirement. These needs came to be provided for, in a large measure, by electric railways, made possible by the abundance or cheap electric power. These electric railways have tended to further broaden the areas of agriculture and industrial operations, and build up many communities distant from our metropolitan centers. They brought comforts to the people, and, naturally, increased realty values. Many of them replaced unremunerative service of steam railroads so that they were welcome even to their competitors.

Relations of Purchasing and Engineering

The speaker, before the Engineering Association, pointed out the necessity for engineering advice and responsibility in present-day purchasing

By **FRANK M. HARRIS**

Chief of Bureau of Specifications and Estimates
Department of Engineering, Pacific Gas & Electric Company
San Francisco, Cal.

BOTH purchasing and engineering have been evolving rapidly during the past two generations. Forty years ago purchasing embraced a knowledge of prices and their seasonal and cyclical trends, where and when to buy, and in what quantities, for maximum economy. During the past twenty years, however, the purchasing agent has been confronted with new factors involving the economies of production and distribution in his markets, coupled with fundamental advances in scientific research and in technical engineering.

Frank M. Harris

The old time purchasing agent with his sound business ability and his trading sense came to talk a new language in which chemistry, mechanical reliability, economies of performance, and technical suitability for a given use are discussed. Steel was no longer just steel; it must satisfy one of the many standards of the national technical societies, in which carbon, phosphorus, and sulphur are specified to one-hundredths of one per cent. Paint was no longer just paint; it must contain certain vehicles and certain proportions of pigments of certain specified ingredients and must pass certain specified tests before and after application. The purchase of all of the common materials of industry was thus complicated by fine technical requirements and standardized specifications, which seriously handicapped the old time purchasing agent buying on price alone.

In parallel with the growth in the complexity of purchasing, an equally distinct transition was apparent in the engineering profession. The engineer of 40 years ago was a specialist in name only. He designed, bought materials, contracted labor and supervised construction, supposedly with equal skill, even when he was not called upon to lend a hand with the financing of the project upon which he was retained. With the entry of specialization into his profession, the engineer was confronted with the necessity for skilled assistance in purchasing, in the person of a specialist who knew markets, materials and vendors, and who could buy wisely.

No feature of purchasing is more important than that of the inspection and testing of materials and equipment. Shall the purchasing agent or the engineer be charged with that? Who shall control the research and development work in the industry concerned? Who shall have the approval of performance bonds, payments on contracts and guarantees? Who shall accept completed work?

Where these technical decisions are being made by engineers attached to the staff of the purchasing agent, the purchasing department is to that extent becoming an engineering department and to precisely that extent is weakening the authority of the engineer, without relieving him, in the slightest degree, of his responsibility.

If this authority-responsibility measuring stick be applied, fairly and fearlessly to co-ordination problems, the division of duties will be such that none can complain and the millennium will have come.

Economies of

High-Speed Motor and Drive

In this address before the Engineering Association, Mr. Bethel shows how high speed affects operation and design

By C. BETHEL

Manager Railway Motor Engineering Department
Westinghouse Electric & Manufacturing Company

C. Bethel

ECONOMIES and advantages of high-speed electrical apparatus design are now well established. The operating speeds of turbines, generators, rotaries and heavy traction motors have all been increased in order to obtain reduced weight for the same rating. Why not take advantage of speed in street railway motor design? In the past this could not be done, except to a limited extent, because of the limitations of single reduction gearing. These limitations have been removed. Inherent economies in power, schedule speeds and maintenance have been shown.

Operation over a period has given a clearer picture of the problem of correlating the motor, drive and truck design, and has brought out the necessity of doing so to get the greatest benefit from the new design.

A more consistent and determined effort on the part of both designers and operators has probably been directed toward the reduction of weight than toward any other one feature of the street car. The original single reduction motor, which was rated at 30 hp., weighed, complete with gears and gearcase, 2,750 lb. The latest axle hung motor rates 35 hp. and weighs 1,475 lb. complete with gears and gearcase. This reduction in the motor weight was brought about by developments in both the motor and in high-speed gearing. The high-speed motors now in common use have a rated speed of about 2,000 r.p.m., in the 35 hp. size, and weigh about 560 lb. or 1,060 lb. complete with gears. These weights in the 50 hp. size are 830 and 1,325 lb.

The high-speed motor need not differ fundamentally from the conventional type. It can be built for 600-volt operation along the lines of its very much larger predecessor. However, it is so small that better performance will be obtained if a 300-volt design is used. The reason for this is that, with the small commutator, the distance between brush-holders becomes so short that the motor is too sensitive to flashing when it operates on 600 volts. With 300 volts on the commutator, however, the volts per inch of periphery are cut in half and the motor becomes much more stable. The voltage to be commutated is also less in the case of the 300-volt motor. There is a further practical gain in the stability of this motor due to its spring suspension, which results in the brushes riding the commutator better. The 300-volt motor is, of course, insulated for 600 volts.

In bringing out the 300-volt motor, the only possible exception to the superiority of 300 volts over 600 volts was the question of the effect on wheel slippage. However, after a service of over one and a half million car-miles with 300-volt motors under all operating conditions of snow, ice, leaves and slippery rails, not one case of wheel slippage due to the use of this voltage has been reported. In other words, the use of 300 volts has been a prominent factor in the development of the high-speed motor.

In order to use this high-speed motor, some form of high-speed gearing with a high gear ratio had to be provided. The problem is to secure a gear ratio up to about 10:1, to eliminate gear noise, to obtain a long gear life, and to obtain a good overall truck design. The worm gear meets the first two requirements of the problem entirely. Ratios even greater than 10:1 may be built quite successfully. The worm gear is inherently the quietest form of gearing, and it never becomes noisy. There is a further advantage inherent in the worm gear in that, with it, it is possible to obtain a large ratio with a minimum of parts.

The principal disadvantage of the worm gear is that it is less efficient than the other types of gears and requires that the motor be placed in the truck with its axis perpendicular to the axle.

The simplest form of gearing is the spur type. While the conventional type of spur gears is somewhat noisy the development of the self-contained gear unit of the double reduction type has virtually eliminated all gear noise. The primary reasons for this are: Bearings on each side of the gears and pinions prevent shaft deflections and assure correct alignment of the gear teeth; roller bearings assure permanently correct gear centers; bearings of large thrust capacity permit the use of gears of large helix angles; running the gears in a bath of clean oil maintains the gears in their original condition for a long period.

With these two tools—the high-speed motor and the gear reduction unit—we have the basis of practically all of the new street car drives. Two fundamental types of drives have been developed so far in this country—parallel and right-angle.

The forerunner of the present type of parallel drive was placed in service in Wheeling, W. Va., in 1925. This was a modification of a standard 35-hp. motor driving a single reduction gear unit through one coupling. At the end of the test, after 80,000 miles of operation, these conclusions were reached: (1) The feasibility of connecting the gear unit and motor through one coupling was established; (2) to take full advantage of the benefits that were established by this drive requires a lightweight high-speed motor. These features were incorporated in 1927 in the high-speed 300-volt motor and WN drive.

The first application of the right-angle drive was made in Springfield, Mass., in 1927. This drive incorporated a number of features then untried in street railway service. The more important of these are: worm drive; differential; provisions for transmitting traction to the axle through semi-elliptic springs; high-speed 300-volt motor.

A number of developments have followed these, but the differences have been in detail and in arrangement. The principal features now being incorporated in the various drives are: (1) the high speed motor; (2) both parallel and right-angle types of drives; (3) trucks with inside and outside journals, with the semi-elliptic spring type of side frame and with the rigid type side frame. Except in fairly minor variations in detail, all of the new type high-speed motor drive designs embody some combination of these features.

One of the chief virtues of the high-speed motor is that its size is such that a material reduction in wheel size and floor height can be made. The WN drive is designed to operate on 22-in. wheels, with 1 in. greater clearance than is obtained with standard motors on 26-in. wheels. It was thought at one time that there might be a slight increase in the wheel and track maintenance due to the use of 22-in. wheels, but experience indicates a decrease.

Modern Vehicles and Equipment

for Urban Transportation

Features of modern street cars, trolley buses and gas buses were described by Mr. Burleson before the Engineering Association

By C. A. BURLESON
Transportation Engineering Department
General Electric Company

TRANSPORTATION companies nowadays have so many types of vehicles and varieties of equipment to choose from that it is difficult to know which type of vehicle to select and what equipment to use. Many things besides the economics of the question affect the operator's decision.

In Chicago we find 99 heavy duty, 60-passenger, two-man single-end cars weighing 44,000 lb. and equipped with four 50-hp. motors, PCM-18 point control and straight air brakes with quick application and release valves. These cars with seated load have an initial acceleration of 3 m.p.h.p.s. and will reach 20 m.p.h. in 9.5 seconds. They have a free running or balancing speed of approximately 31 m.p.h. on 560 volts.

C. A. Burleson

In Baltimore some very interesting work has been done. A car has been equipped with 26-in. wheel trucks, GE-301 motors, and PCM control arranged for field shunting. The motors have bottom brush holders for easy inspection and adjustment. An automatic self-lapping valve is used and the regular air brakes are supplemented with track brakes. This experimental car has an unusually fast getaway, being able to make 30 m.p.h in 600 ft. from rest.

The United Traction Company at Albany is operating a modern lightweight, single-end, 44-passenger, front-entrance, center-exit car, equipped with four GE-265, 35-hp. motors. It has foot operated PCM control, foot operated air brakes and air operated magnetic track brakes. Considerable aluminum alloy was used in the body to reduce weight. The complete car weighs 32,000 lb.

With the four-wheel brake becoming general, street car operators must seriously consider the use of the magnetic track brake to increase braking rates, particularly in emergency, so that they not only can keep up with the procession, but also stop with it. Certainly we cannot make maximum use of our higher-powered cars with higher free-running speeds if we do not take full advantage of this extra power for fear we cannot stop as quickly as the next fellow. Any other form of braking is limited by the adhesion between the rail and the wheels. This is not enough to compete with present forms of transportation and should be supplemented especially for emergency. The magnetic track brake adds 25 to 30 per cent additional braking retardation, and this is particularly necessary with a slippery rail.

Trolley buses have been in successful operation for five or six years but it was only recently that the modern trolley bus was put on the map in this country by the Utah Light & Traction Company.

Chicago has recently put 41 trolley buses in operation as feeders to their street car lines. These buses seat 40, weigh about 17,000 lb., are equipped with 40-in. tires and worm ratio of 10.25 : 1. Two 50-hp. motors, automatic control and four-wheel brakes make a fast, smooth operating vehicle with a balancing speed of about 32 m.p.h. on 560 volts. In Knoxville, four 43-passenger trolley buses with two GE-298 motors and PCM control have recently been put in operation.

The third vehicle to be considered is the gas-propelled bus. Electric drive is now available for 21-passenger vehicles up to double-deck buses seating 67. Larger and more powerful engines are the talk of the day. The Public Service Railway of New Jersey has recently placed in service 170 high powered gas-electric buses which weigh about 18,500 lb., have a 240-in. wheelbase, seat 40 passengers, are equipped with 40-in. tires and a gear ratio of 9.25 : 1. The engine has a rated horsepower of 150. Direct connected to this engine is a DT-1121 generator which furnishes power to two motors which, in turn, drive the rear axles. On account of the increased size of the engine a new motor known as the GE-1151 was developed. Each of these motors rates 45 hp., continuously.

Elimination of Waste

Waste elimination, effected through efforts of supervision, was the subject of this address before the Engineering Association

By A. S. DUNCAN
Assistant Director of Finished Stocks
Westinghouse Electric & Manufacturing Company

THAT we are a wasteful nation has long been known, but the extent to which the industries are involved should be studied because recent investigations show that over 50 per cent of the responsibility for waste can be placed at the door of management, and less than 25 per cent at the door of labor, while the amount chargeable to outside contacts, such as the buying public, trade relationships, etc., is least of all.

Since by far the greater percentage of the responsibility rests with management, it stands to reason that to overcome the evils which tend toward waste through carelessness it must be approached from the angle of supervision.

One of the greatest profit consumers in any line of business is unproductive labor. By eliminating this, or at least reducing it to the smallest possible amount, it will often be the means of transferring many a business from red to black entries. While it is recognized that overhead, or unproductive labor, even of the least skilled type, is possibly necessary to some extent, yet there are often ways and means whereby this can be placed on the same basis as productive labor and get the maximum amount of efficiency at the minimum cost by using incentive methods.

The elimination of material waste can be carried to the same extreme as elimination of excess labor waste. For example, take the classification of iron and steel scrap on just two grades alone—what is known as the "No. 2 Steel" and the "Heavy Melting Steel." The former has a higher value than the latter, and, by installing a pair of shears in the majority of the locations, this can be turned into a very profitable proposition, securing about 60 per cent increase in price for this scrap.

It is always desirable to have master keys and go through the workmen's desks or lockers where they usually store material used in their line of operations. This, however, should be done in their presence, and any material in excess of a two days' supply needed for the task they are actually working on at that time should be returned to stores and credited.

A. S. Duncan

What quantity production is to the successful manufacturers — quantity purchase is to the utilities. Where material is sold on quantity discounts, a vital mistake is made in trying to measure successful operation by turnover to the detriment of economy in purchasing. In many instances it is economy to purchase in quantities ranging as high as a year's supply at one time, providing the discounts warrant it and the possibilities of obsolescence through disuse are reduced to a minimum, and arrangements may be made for protracted deliveries. At this point, co-ordination among engineering, purchasing and storekeeping is positively imperative.

Successful business follows an iron-clad rule of writing off each year, into the depreciation account, a certain percentage of the original costs of buildings, tools, equipment, etc., naturally reducing overhead profits to a certain extent, but at the same time paying taxes on only the actual worth of the investment. The same rule may be followed just as conscientiously in the handling of your frozen investment, regardless of what it may be. In following any rule on frozen investment for the first time, the totals, naturally, will be extremely high and, as such, one fears criticism for what apparently seems to be an error in judgment in ordering material, but after this has been in vogue two or more years, the results will compensate for the anguish expended. I don't know where it is possible to save more money, particularly where the investment is large, than by moving material that has reached the slow moving, inactive, or obsolescent stage to a quick turnover basis.

Slovenly housekeeping, more than any other single factor, is the cause of waste. A motor car manufacturer, having purchased a steam railroad, has been quoted as saying that he paid a very substantial dividend on the total money invested by cleaning up and salvaging material found on the right-of-way. Be that as it may, there is no question but that all of us, regardless of lines of business, are extremely careless in wasting material.

Try this. Go through your own storerooms. Notice how the material is piled and protected. Then go to the department that uses this same material and see how they handle it and if they properly protect it before and during its use. From there go to your salvaging or scrap department. You will no doubt find material there that, instead of being sent back into stock after the day's work or completion of the job, has gone into the day's waste and is on the road to the incinerator, or being accumulated for selling to the scrap dealer.

Also, if you have different storerooms, form a committee among your men and let them visit storerooms other than their own and give constructive criticism on methods of cleanliness, piling, and taking care of material. By this method, you will find that you will be able to secure some startling results. Regardless of the experience of the supervisors, men employed handling material, if interested, often will see things that those in authority, as a rule, will pass over. The principal thing, however, is to drill into them cleanliness and neatness. Keeping material fresh, neat and clean should be one of the principal determining factors for efficiency.

Great progress has been made, and we can go still further by remembering the principles of waste elimination, and the definition of the word "waste" as thoughtless or idle expenditure without hope of return.

Claims Men Discuss WITNESS STATEMENTS *and Related Subjects*

W. E. Foley
President

IN THE absence of President W. E. Foley, the sessions of the Claims Association were presided over by J. H. Handlon, claim agent of the Market Street Railway, San Francisco, a past-president of the Association.

"The coming together each year at these conventions affords to the claim agent and members of his department a splendid opportunity to exchange ideas with other claims men from various sections of the country," said Mr. Foley, in his address, which was read to the gathering. "It also enables him to keep abreast of the times, which, in my opinion, is one of the essential factors in the claim agent's work. We are all aware of the value of personal acquaintance in the exchange of business courtesies. Time and again in our work there will arise a situation demanding investigation of witnesses or the settlement of claims in distant cities. It is gratifying to know, when such an occasion arises, that a telephone call or a telegram to a fellow member will bring the desired result." Mr. Foley also made a plea for a wider support from the membership of the work in which the Claims Association is engaged.

The report of the executive committee was read by A. E. Nicoletti, assistant claim agent Key System Transit Company, Oakland, Cal., following which the report of the nominating committee was read. The entire ticket was elected, as follows:

President—C. E. Redfern, United Electric Railways, Providence, R. I.

First Vice-President—J. W. Giltner, Northern Ohio Power & Light Company, Akron, Ohio.

Second Vice-President—L. H. Butterworth, Boston Elevated Railway, Boston, Mass.

Third Vice-President—E. S. Nelson, Pacific Northwest Public Service Company, Portland, Ore.

Secretary-Treasurer—Guy C. Hecker, American Electric Railway Association, New York City.

Executive Committee—Officers and Bert C. Wood, S. A. Bishop, E. J. Paige, and G. T. Hellmuth.

Following the official business of the session, the meeting was turned over to B. F. Boynton, president of the Pacific Claim Agents Association, and a joint meeting was held with that body.

Papers were read on "Bus Accidents—Their Causes and Prevention," by S. A. Bishop, general claim agent Pacific Electric Railway, Los Angeles, and W. R. Sherman, general claim agent, Spokane, Portland & Seattle Railway, Portland, Ore. "With my property, 60 per cent of all mishaps are so-called traffic accidents," said Mr. Bishop. "They are responsible for the major part of the work of the investigation personnel, although their costs are only 26 per cent of the total claim costs. They cannot be prevented wholesale unless perhaps by more thorough training of employees and the stricter application of the rules. The best way I know to get definite results is to investigate each accident, go over the facts with the employee involved, point out to him his responsibility, administer commensurate discipline, demand improvement, and follow up with removal from service if the employee is unresponsive or imcompetent."

In the discussion that followed, P. W. Klabunde, of Milwaukee, described the training road which has been built by his property for the instruction of drivers. W. H. Moore, San Diego, spoke briefly of experiences in that city. Mr. Bishop expressed himself in favor of insuring high-speed buses against accidents and carrying the risk on slow-speed city buses. A. E. Nicoletti, assistant claim agent Key System Transit, Oakland, Cal., stated that his company is working to establish the negligence of automobile drivers in many of the accidents which occur. This relieves the company of responsibility. In some instances it has been found possible to bring suit against the automobile driver as the third party where he was at fault in causing an accident in which a patron of the company or an outside person was injured.

Methods of impressing employees with the importance of obtaining all available witnesses and gathering material facts at the time of the accident was the subject of a paper by Mr. Nicoletti.

He stressed the necessity of securing as many competent witnesses as could be obtained, and particularly of getting the names of persons who, although they might not have been eyewitnesses of accidents, were present.

Another paper on the same subject was presented by J. E. McClain, claim agent Austin Street Railway, Austin, Tex. His paper is given in abstract elsewhere in this issue. In the discussion, Mr. Klabunde stressed the necessity of getting facts as soon as possible after the accident occurs.

People passing by on the street are often better witnesses than passengers, since they may have been able to see the entire occurrence, while those on the vehicle might have had a limited view. People who state to the operator that their testimony would be no good as it would be against the company often prove the most valuable witnesses, he said, and should not be neglected. Distances of the various elements involved are important. They should be obtained at the time of the accident, as marks on the pavement are obliterated soon afterward, particularly if the traffic is heavy. E. E. Grover, Columbus, Ohio, is opposed to the method described for obtaining witnesses. He feels that if the operators are told they must turn in a large number of names, they may not be particular about whom the people are. Mr. Bishop, on the other hand, does not believe in allowing the trainmen to use any discretion, but advises getting as many names as possible and sending out questionnaires to them. This view was held by a number of other speakers.

"The Value of Motion Pictures in Claims Work" was the subject of a paper by C. M. McRoberts, Los Angeles. Mr. McRoberts demonstrated the effectiveness of motion pictures in establishing facts regarding accidents by showing a number of films which he had taken.

Wednesday Session

The second session of the Claims Association, held on Wednesday afternoon, opened with a report of the committee on uniform negligence law which pointed out that in the opinion of those who drafted a sample bill for the consideration of state legislatures the act would prove constitutional if put before the courts and, if passed, would do away with much unpleasant litigation.

In a paper dealing with the subject of whether the company surgeon should call on the injured immediately after the accident or wait until the liability is determined, M. C. Chapman, Jr., concluded that no hard and fast rule could be adopted. Discussion brought out a majority opinion that where the company is obviously liable, the staff surgeon can prove a valuable emissary of the claims department by calling on the injured as soon as possible. Also the value of taking X-ray photographs at the time was stressed. Such records often prove invaluable at some later date.

The subject of blind accidents and how to handle them was covered in papers by G. T. Hellmuth and J. W. Giltner, abstracted elsewhere.

Two papers dealing with legislation affecting guests of motorists who are injured in accidents were followed by lengthy discussion. There is a strong tendency in most states to absolve the driver of a car from liability when carrying gratuitous passengers. Several states now have laws absolving the operator of a motor vehicle of claims in case of accident except in cases of gross or willful negligence. Oregon is the only state to have passed a law absolving the driver of *all* risk but this act has been declared unconstitutional. It was the opinion of the authors of the papers, as well as several who participated in the discussion, that state legislative bodies are in a receptive frame of mind to pass laws which will to some extent define negligence in such cases. Also the belief was expressed that the time is near at hand when jurors will not be permitted to measure negligence by a flexible yardstick but will have this vital point defined by a commission.

Painstaking Investigation Reduces Fraudulent Claims

Eternal vigilance is the price of protection in dealing with blind or fraudulent claims, according to a statement made before the Claims Association

By G. T. HELLMUTH
Claims Attorney Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

G. T. Hellmuth

BLIND accidents include accidents that really occur and those that are fraudulent. But in either case intensive work by the claim department is imperatively necessary, and especially so in the fraudulent type of claim.

There lies at the root of this evil of blind accidents a ready cure afforded by training all employees to report any and every accident, no matter how trivial it may appear and no matter how disconnected the company may seem to be from the actual occurrence. It is unfair to the company for any employee to allow an accident to be unreported.

As to the handling of fraudulent claims which so often are based upon "blind" accidents, my company has made it a policy for the past eighteen months to prosecute dishonest claimants wherever we could establish such dishonesty, and we have been successful in jailing some ten or twelve of them in the past year and a half.

In Chicago an index bureau is maintained by the insurance companies and supported by most of the carriers. All members report to the bureau the claimant's name and address, and full records are kept, not only alphabetically by name, but also numerically by street number. The bureau does not rely solely on the reports of its members, but indexes as well personal injury plaintiffs and all law suits commenced in Cook County. Through the help of the index bureau, it has been possible time and again to catch a claimant who is in the habit of making frequent fraudulent claims.

I am a firm believer in the policy of painstaking, thorough and complete preparation of any litigated matter, and in my judgment we can hardly go too far in going into every angle and detail. I feel, also, that haste is liable to make waste, if we are too precipitate in paying a "blind" claim. If it is not yet in the shape of a law suit, I think it ought not to be paid until we have turned the strong searchlight of investigation upon it, and if it is sued upon, we should leave no stone unturned in investigating the facts from every possible angle.

Securing the Facts Is the Basis of Accident Investigation

By J. E. McCLAIN
Claim Agent, Austin Street Railway
Austin, Tex.

That unfavorable evidence can be as valuable as that which directly favors the company was the substance of an address delivered before the Claims Association

I AM a firm believer in the great importance of the education and proper instruction of our employees. No operator or other employee of a corporation who has not been instructed in, and taught the fundamental principles of his organization, can render the same efficient service as one who has had the proper instruction and training. The first and most important of these principles which should be conveyed to persons entering the service of a corporation is the principle of elemental facts.

They should be taught that in all cases their first duty to their employer is to gather and present through the proper channels all known facts concerning each particular case, and should supplement this by any other information pertinent to the issue. These facts should be obtained as soon as possible after an accident, and should include evidence unfavorable, as well as that favorable to the company. Failure on the part of the trainman to secure the name of one witness, even, may result in the claim agent of his company making a wrong decision in the case, thereby causing the company the loss of a large sum of money.

Trainmen should be given special instructions in the gathering of evidence at the scene of an accident. Details must be secured at the scene of the accident and immediately after it occurs. A few minutes of delay and at the most, a few hours under ordinary traffic conditions, will tend to erase all traces of the accident on the pavement.

In getting these instructions over to the personnel of an organization in an impressive manner, I know of no better way than for the claim agent to appear before them in person; particularly is this true when there are only a few men to contact. When you get a trainman, who has fallen short in handling his accidents, face to face, and go over the case with him in a friendly and co-operative manner, I feel sure that a great deal more good would result than from any other method which might be used.

When all has been said and done concerning the best methods of impressing employees with the importance of obtaining all available witnesses and gathering material facts at the time an accident happens, the whole thing resolves itself into the matter of education. Give the trainman the proper instruction in the matter of obtaining and presenting all facts pertaining to each and every accident, and we have taken a long stride toward reducing the amount of claims paid because of lack of facts to substantiate our rejection of them.

Blind Accidents and How to Handle Them

By J. W. GILTNER
Chief Claim Agent, Northern Ohio Power & Light Company
Akron, Ohio

Methods of investigating and dealing with the unreported accident are set forth in detail in paper read before the Claims Association

BLIND accidents — sometimes called "no-report accidents"— are those about which we receive our first information from an outside source. It may be advice from an attorney who represents the claimant; it may be a telephone call from the claimant or some neighbor, friend or relative acting for him; it may be a call from the doctor in attendance, the favor and co-operation of whose fraternity we have always tried to merit; occasionally the information is relayed through one of the operators of a following car or bus, and now and then a claimant comes to our office and presents the matter in person.

In all cases except those reported by attorneys, it seems to me the course of our procedure is obvious. The injured person must be interviewed at once, in his home if possible, where, surrounded by his household goods, his family and neighbors assembled, a more accurate estimate of his honesty and reliability is possible.

In this first interview the investigator will go into the claimant's past history and watch intently for previous accidents, injuries, sicknesses and for doctors and lawyers used by himself and intimates. He will learn his places of residence, his employers, his acquaintanceship with attorneys, his experience in law suits, his church and lodge affiliations, the names of insurance companies with which he has carried accident insurance coverage, and will be on the lookout for evidence of a connection between this claimant and other claimants in shady cases handled previously.

Coming closer to the case in point, the investigator has the claimant detail his movements and associates for several hours preceding the accident. Thus a fund of information is secured—much of it possibly is of no value—but no one can tell what can safely be ignored. In it is found all available material for the investigation. In a second interview the correctness of the data given can be checked in the manner referred to previously.

In the case of a blind accident reported by an attorney, it is our practice to recognize and respect all the rights of an attorney to bring his client and supporting witnesses to our office for an interview. In such cases no further discussion is necessary, for the course pursued is identical with that outlined above.

Accountants Give Attention to Budgetary Control

E. H. Reed
President

THAT the era of consolidations and mergers which are constantly taking place in the utility field has created new opportunities as well as new problems for the accountant was emphasized by E. H. Reed in his opening address before the accountants' association. The new obligations imposed upon the profession, according to Mr. Reed, call for a full perspective of the science of accounts to enable one to visualize the enormous transactions which are taking place in the present-day business world.

Perhaps the most important feature of the past year's work of the accountant's group has been the work of the committee on budget control, which has devoted itself to the preparation of a model budget in detail which, when completed, should be of great value to operating managements.

Mr. Reed paid tribute to the committees having in charge the subjects of standard classification of accounts, bus accounting, stores accounting, fare classification, and freight accounting, reports on all of which were submitted at the meeting.

"The Capital Structure of Public Utilities" was the subject of a paper presented by John F. Forbes, resident partner Haskins & Sells, San Francisco. An abstract of his paper appears elsewhere in this issue.

Reports were received from the committee on standard classification of accounts and from the sub-committee on bus accounting. These reports are abstracted elsewhere.

Among those taking part in the discussion were C. C. Vargas, Key System Transit Company, Oakland; P. S. Young, Public Service Coordinated Transport, Newark, N. J.; W. H. Scott, Municipal Railway of San Francisco, and A. G. Neal Washington Railway & Electric Company.

How the auditor can most effectively aid his company by becoming an analyst rather than a mere recorder of figures was brought out in a paper presented by Leslie Vickers, economist, A.E.R.A., at the second session of the Accountants' Association. An abstract of this paper appears elsewhere in this issue. Following the presentation of his paper, Mr. Vickers gave an interesting explanation of the attitude and plans of the Interstate Commerce Commission in the matter of cost accounting. It was brought out by Mr. Vickers and also by John F. Moran, Boston Elevated Railway, that the subject of obsolescence has a very important bearing on depreciation accounting. In the absence of the chairman, the report of the committee on budgetary control was presented by C. E. Yost, Delaware Electric Power Company. This report is abstracted elsewhere.

Resolutions were presented on the death of three members of the association, W. G. Ross, F. R. Henry and F. E. Webster.

The report of the committee on nominations was then presented. Officers named for the coming year were:

President—C. E. Yost, treasurer and assistant secretary, Delaware Electric Power Company, Wilmington, Del.

First Vice-President—J. E. Heberle, assistant to president Capital Traction Company, Washington, D. C.

Second Vice-President—E. A. Tuson, general auditor Public Service Co-ordinated Transport, Newark, N. J.

Third Vice-President—C. R. Mahan, comptroller Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

Members of the Executive Committee—L. T. Hixson, secretary and treasurer, Indianapolis Street Railway Company, Indianapolis, Ind.; R. A. Weston, special accountant the Connecticut Company, New Haven, Conn.; R. L. Crowe, vice-president Los Angeles Railway, Los Angeles, Cal., and J. D. Evans, general auditor St. Louis Public Service Company, St. Louis, Mo.

These officers were unanimously elected and Mr. Yost was installed in the chair. A resolution was passed thanking the retiring president, E. H. Reed, for his services during the past year, and the badge of past-president was presented by O. H. Bernd.

Accountants' Luncheon

DISCUSSIONS of capital charges formed the principal topic at the Accountant's luncheon, which was presided over by President E. H. Reed. Those present took up in considerable detail the subject of cost analysis in connection with construction of track. The procedure necessary in taking up the old track and putting down new track in its place was gone over. In the discussions, methods of segregating charges to capital and to operating expenses were considered.

Fare box collection was another topic discussed. It was told that on one property experts showed methods by which the fare box could be rifled. Due to the analysis made, the manufacturer was able to revamp his design and produce a new fare box which would be theft-proof.

Another subject discussed was checking of material and supplies in connection with orders. The case was cited of an order for major repairs to a group of cars. Material was purchased when, had a check been made with the storekeeper, it would have been possible to use the supply of material already on hand and which has been standing idle for some time.

Those taking part in the discussion were E. H. Yost, Delaware Electric Power Company, Wilmington; E. C. Jolley, San Antonio Public Service Company; W. H. Scott, Municipal Railway of San Francisco; J. W. Glendenning, Commonwealth & Southern Corporation, New York; and others.

The Auditor as an ANALYST

Opportunities to do work of great importance and value are outlined in this address before the accountants association

By **LESLIE VICKERS**
Economist
American Electric Railway Association

THE greatest need of our industry today is analysis. You may talk about our need for new cars, for rehabilitated tracks, for new fare structures, for relief from paving and taxation burdens, for traffic regulation and increased public understanding of our business. All of these are necessary and worthy of the stress that is being laid on them, but to discuss them intelligently as applied to any individual property, we need first, the kind of financial analysis that should be made within the auditor's office. It does not necessarily follow that he is the individual who should do it. But he and his associates in the accounting department are the main cog wheels in the machine that can accomplish it. As a matter of fact, there is no one on an electric railway property who can afford not to be an analyst and it is partly because so many of us have accepted things as they are that our industry is in the condition in which we find it today. With certain exceptions, our properties have not done what they should in analyzing service—in finding out what part of it is adequate, what part is inadequate and what part is unnecessary and wasteful; they have not analyzed their patronage to determine whether or not the fares they charge fit the kind of traffic for which they are intended; they have not analyzed the equipment to see if it should be retained or replaced, or whether some alternate form of service should be substituted; and they have not analyzed their operating costs by lines, by routes, by times and by seasons, their shop and track costs by units, or their operating revenues by classes of service or with relation to the new and old investments which they represent. Of course, there are some properties that are doing all of these things and they have approached reasonably close to a thoroughgoing cost accounting basis. Their auditors and accountants are able to tell with a fair degree of accuracy at any moment what the various classes of service are costing, and more than this, they are displaying, in a timely way, the red signals of danger which the operating executive may pass only at his peril. The auditor, by his careful analysis, may not have the final word, but he speaks so authoritatively that he cannot be ignored by those who do have it.

Leslie Vickers

But as an industry we stand in marked contrast with modern manufacturing industry, and indeed with some of the other public utilities as well, in lagging far behind in the matter of cost accounting. Manufacturers must know their individual costs. The time has passed when goods will sell themselves except in certain highly specialized or monopolistic lines—and money is so plentiful, and so eager to find a profitable investment that it soon rushes in to provide competition for the manufacturer who is so careless about his costs and knows so little about his unit margin of profits that he sets his selling price at an attractive point for the establishment of the very competition that will ruin him. A roll call of the industries that have established cost accounting systems and have followed them up to the degree approved by the Taylor Society is a surprising one. It includes the highly seasonal industry of the manufacturer of Christmas cards or the retail distribution of a highly perishable commodity such as milk; it includes ships and heavy machinery builders and confectioners; automobile builders and manufacturers of fly paper; steam locomotive builders and the producers of Eskimo pie. Indeed there seems to be no limit to the application of cost accounting principles, nor yet to the degree of refinement to which they may be carried.

Since I am not an accountant nor an auditor, it is fitting for me to state that I see no great difficulty in the application of very far-reaching cost accounting principles to our industry, and furthermore, I am aware that some up-to-date companies have done much in this direction. But as an industry we must do much more. We must remember that we have a service to sell and not merely to provide. Herein lies one of our weaknesses. Many of us have acted as if our commodity would sell itself, once it were provided. We began our life as a monopoly and some of us have failed to realize that we have developed into a highly competitive business in which we have to provide the kind of transportation that people want, at the time they want it, and at a price they will pay. The old solid iron-tired horse coach could not compete with the horse car on rails; the horse car on rails gave way under competition and development to the cable and then to the electric car, and that vehicle maintained its predominant position for many years until the light passenger automobile came in and demanded smooth surfaced roads, and smooth surfaced roads in turn helped to develop the pneumatic tire. The pneumatic-tired private automobile, operating over roads almost as smooth as our own steel rails, is our great competitor for service today, and we not only have to *furnish* service but we must *sell* service to meet the competition which it creates.

This is neither the time nor the place to insist on the essential nature of common transportation service.

Indeed, it is scarcely necessary to assert it at any time or in any place, for it is self-evident and readily apparent to the resident of any city.

But it is both the time and the place to assert the existence of such competition in service, comfort, convenience and price as to force us to the same careful scrutiny of services and analysis of costs as faces the manufacturer of any other competitive article. All of this involves analysis of the most patient kind.

We must all be analysts from the general manager down to the man at the bench; from the superintendent of traffic and transportation to the man on the rear platform; from the auditor to the clerks in the receiving department. But the degree of responsibility varies with the rank of the individual, and this is great in the case of the auditor because of his high standing and his comparative isolation from the routine problems of providing service. It is great because the figures in all the accounts pass before him; because it is his function to make comparisons, and because it is his final authority to pass judgment on the validity of charges and entries.

With such a responsibility and such an opportunity, how can an auditor be content to act merely as a figurer? How can he resist the role of analyst? To remain a figurer is like working in a dingy unlighted office with the grey and uninteresting procession of figures, more figures and more figures passing before his blurred vision, when the opportunity is before him to turn on the light of analysis and scrutiny, breathe life into the columns that face him and see before him an interesting landscape replete with beautiful scenes, living, breathing human beings to be served, and challenging problems to be solved. The analyst's attitude toward his job will lift it out of routine, work-a-day toil into the realm in which students work because they enjoy the search for truth; into the realm of causes rather than the realm of facts; into the realm of things dynamic and full of life and out of the realm of things static and lifeless.

Capital Structures of Public Utilities

In an address before the Accountants' Association the author outlines the various entities of which utilities are composed

By JOHN F. FORBES
Resident Partner, Haskins & Sells
San Francisco, Cal.

PRIMARILY the financial structure of any corporation is disclosed by its balance sheet, but there are a great many reasons why the balance sheet of a public utility while apparently similar in form and content to that of every other form of enterprise, must be considered from an entirely different point of view.

In the case of a manufacturing or trading company, for instance, the current financial position is of outstanding significance. In considering the propriety of credit extension to such enterprises, bankers emphasize the relationship between current assets and liabilities since the former normally represent the source from which repayment of loans arises. Logically, the greater the excess of current assets over current liabilities in a given instance, other things being equal, the stronger is the credit position of the borrower. If, as in the past, bankers have usually considered a current ratio of 2:1 satisfactory, a ratio of 6:1 would be proportionately more favorable.

The same method of reasoning however does not apply in the case of the public utility. Indeed the reverse might possibly be true, and for the following reasons: The current assets of any corporation consist essentially of cash, accounts receivable, and inventories, and the current liabilities consist usually of those debts which have to be paid within a twelve-months' period. In an industrial, and in many other forms of enterprise, the cash may be used immediately in the liquidation of the payables. In the normal course of business operations, the conversion of the inventories into receivables and the latter into cash provides the means of liquidating the liabilities. Ordinarily the greater these assets are in relation to the liabilities, the greater is the financial stability of the enterprise.

But in a public utility the amount of cash which may be economically carried is dependent altogether upon the financial plans of the company, and if the accounts receivable exceed the earnings of, let us say, two months, this is probably a sign that the collection department of the concern is not functioning properly or that the company is selling power or transportation, or whatever service it does purvey, in violation of the ordinary rules of business.

The inventories too are not to be converted into cash except in those few instances where appliance sales departments have been introduced into the utility. The inventories usually comprise almost entirely materials and supplies which are to be consumed in the rendering of services to consumers. And the carrying of a large inventory on the part of a public utility may be a sign of great weakness rather than one of strength, for the reason that if the material is not to be used within a reasonable period it represents so much dead investment for the cost of which the company is paying heavily in bond interest or otherwise. So, if a banker is considering the credit possibilities of a public utility, instead of considering the ratios of current assets to current liabilities, he should investigate the daily or weekly or monthly income since that is the source to which he must look for payment.

The banker ordinarily gives little consideration to the fixed assets of the industrials as security for a loan for a variety of reasons. A mill dedicated to the manufacture of cotton stockings might have little value in a silk-stocking era, and the vicissitudes of trade generally serve to render precarious risks based upon such permanent assets. And, too, so-called "capital loans" are likely to become frozen. But the permanent assets of a public utility form an infinitely better security. Even these assets may be seriously affected in their present value, as is illustrated in the effect which the automobile has had upon street car lines, but in the case of the utilities the transition of fixed assets from good to bad is slow.

American Association Committees Active During Year

ON ACCOUNT *of the shortness of the Association year, due to the convention being held in June instead of October, it was not possible for the committees to complete their assignments to the extent that is done ordinarily. Many of them are engaged on projects that require a greater time than was available, and were able only to report progress. Four of the committees, those on national relations, street traffic economics, employee relations and publicity, prepared printed reports which were distributed prior to the meeting. Their reports are abstracted below. Other committees made oral reports which are mentioned in the proceedings of the sessions.*

NATIONAL RELATIONS

REORGANIZATION of the Washington office was described, and the advantages accruing discussed in some detail.

The necessity for clarification of the Interstate Commerce Act with reference to electric railways was pointed out. The principal development during the year was the Supreme Court decision on the Piedmont & Northern case. This has merely thrown the case back into the lower courts without a decision as to its merits. Since the case involves the entire matter of jurisdiction of the Interstate Commerce Commission, including issue of securities, it is of vital importance to find a solution of the problem presented by it.

The bill to control motor buses in interstate commerce is not yet adopted, and certain modifications are necessary to make it desirable after its amendment by the Senate. Certain other legislation proposed is reported on by the committee.

STREET TRAFFIC ECONOMICS

FOUR principal subjects were studied by the Committee on Street Traffic Economics: (1) Possibilities of signal design; (2) parking in neighborhood business centers; (3) use of the public streets, and (4) taxicab operation. The need for proper engineering treatment of traffic problems is growing more acute, states the committee, and railway managements must take the leadership in directing the development of proper traffic control. Public officials and business men will not develop so great an interest in producing freedom of movement on the streets as the alert management of the transportation system. Competent engineering analysis should be undertaken and careful development by concerted planning with the business groups and public officials should be carried out.

On the subject of traffic control and signaling, the increasing accidents in cities are held to be mute evidence of the ineffectiveness of signals and traffic control as now operated. Transit speeds and riding habit have steadily declined in most cities until the industry is now faced with the problem of street speeds of 4 to 6 m.p.h. or even less through business arteries, and even 6 to 8 m.p.h. on long stretches of trunk arteries. Private transport is equally handicapped.

While the relative numbers of riders and pedestrians vary widely in different parts of a city, rarely are different selective methods adopted to meet these situations. Excessive delays have added to freight delivery costs as well as those of city passenger transport.

The committee believes it is quite clear that the total riding habit or demand for transport is increasing steadily with population growth, as indicated by the necessity riding. Far more intensive study of their problems should be given by both city administrations and operating companies.

Specifically, it is necessary to study the street system and main thoroughfare plan with the object of securing the most appropriate classification for various uses, easing bottlenecks, providing by-passes and releasing full traffic capacity of main arteries pending the development of new ones. Complicated intersections should be given individual study. Signal systems already installed, if not of high efficiency, should be replanned to develop full traffic capacity of thoroughfares under control.

The net effectiveness of present traffic enforcement facilities demands study. This has entirely escaped attention, the committee feels. Transit routing and methods should be examined to discover the best means of expediting progressive movements, promoting short-haul riding facilities, simplifying terminal district layouts and releasing the congested districts from unnecessary turning obstructions.

Study should be given to the joint effect of city and state regulations on transport operations; first, physical regulation over city streets and traffic; and second, economic regulation of the state commissions.

It would appear essential that transport companies participate far more actively in this survey and planning work than they have done in the past, for their own good and protection. Co-operative planning should bring quick and positive results.

Considerable space in the report is devoted to a survey of recent experience and effects of city traffic signaling. While the trend is definitely toward the full flexible progressive system, progress is considered slow and piecemeal, with all too little evidence of signaling conceived as a system on a broad master plan. Examples of city systems are cited, and it is held that only two or three of them approached this ideal. The synchronized system, generally inflexible and with too long cycles, reduces street capacity and speeds to almost half pre-signal values. There also is an increase reported in peak power loads.

Some important points in design are taken up in considerable detail. The necessary information to be secured and methods of analyzing it are discussed. Studies of turning movements and of full street filling are deemed desirable. The cycle length and split-timing allotted must be sufficient to pass the traffic.

Advantages of the skip signal progressive system, with only the main crossings of a traffic artery

Chairmen of American Association Committees

1. J. P. Barnes, Nominations.
2. W. E. Wood, Publications.
3. L. S. Storrs, Resolution on Death of N. F. Brady; Subjects and Meetings; National Relations.
4. C. S. Hawley, Manufacturers' Advisory.
5. H. L. Geisse, Taxation.
6. Paul Shoup, Chas. A. Coffin Foundation Prize.
7. H. B. Potter, Insurance.
8. J. H. Alexander, Membership.
9. J. H. Hanna, Policy.
10. Edward Dana, Employee Relations.
11. T. Fitzgerald, Electric Traction Speed Contest.
12. F. W. Doolittle, Finance.
13. G. A. Richardson, Street Traffic Economics.
14. E. F. Wickwire, Manufacturer's Contact.
15. F. R. Coates, Co-operation with State and Sectional Associations.
16. Dr. Thomas Conway, Jr., National Relations Subcommittee on Depreciation.
17. Barron Collier, Publicity.
18. R. R. Bradley, Interurban Legal.

signaled, 1,000 to 2,000 ft. apart, are not believed to be fully understood. With through-street stop signs on the cross streets at intermediate locations there is reasonable freedom of movement. Along with skip stops trunk transit lines show possibilities of increases of speed of 20 to 25 per cent.

Pedestrians will not wait for long cycles in crossing streets, judging from observations of 60,000 instances. More than two-thirds disobeyed the red signal on a 125-second wait and only one-fourth on a 55-second wait. The short cycle gives both high efficiency and pedestrian protection.

Several pages of the report are devoted to a discussion of results of signal surveys in several cities. The synchronous type of signals gave very poor results, slowing down speeds greatly both in rush and nonrush hours. Street car speeds were reduced 25 to 40 per cent. The effect on the crews has been to discourage them.

Parking also was studied in detail. Elimination of parking would not affect business adversely and would facilitate all vehicle movement. Public transportation should be such as to encourage the use of public carriers.

Taxicabs are considered necessary without question, but the committee did not feel ready to make definite recommendations regarding them. Taxicab stands were discussed, and the results in Chicago, Philadelphia and Brooklyn were cited. It was found that the taxicab traffic constitutes from 3 to 8 per cent of all traffic in the congested area and cannot, therefore, be an important factor in causing traffic congestion.

EMPLOYEE RELATIONS

THIS year the committee on employee relations paid particular attention to the personnel side of the industry. It believes that the conference method of training is the most promising avenue of improved public relations and employee inspiration, and the conclusion was reached that the most important business of the committee is to convince the industry that this work must be done. The present committee and its predecessors have tried to prove that education and training of employees are necessary to secure the best results, and to suggest ways in which the education and training can be given.

For several years it has been urged that the principal value of work of this class lies in two fields: the foreman conference for all supervisory officials, and the employee conference on customer contacts or service betterment. At conventions, demonstration foreman conferences have been given and training courses for leaders of such conferences have been conducted. This year the location of the convention and the short time have made it difficult to continue along the same lines, but it has been arranged to provide a demonstration of an employee conference before a group of men especially interested in this method.

For next year it is recommended that the work be divided among a number of subcommittees, each of which takes a phase of the relations of the worker. It also was suggested that instead of continuing the annual training course in connection with the convention, several series of conferences be held at central points in various sections of the country at convenient times. The exact character of these conferences was not determined, but it was suggested that one group be for training leaders for foreman conferences and another for training leaders for salesmanship, public contact or service-improvement conferences of car men and other employees not of supervisory rank.

The appendix of the report contains an article by M. B. Lambert on "Selling the Executive on the Importance of Employee Relations Work." Another appendix gives a complete list of books and articles which have appeared recently on topics bearing directly or indirectly on employee relations. This list was compiled by Henry H. Norris of the committee and Lewis A. Armistead, librarian, Boston Elevated Railway.

PUBLICITY

TRAFFIC congestion relief has been the subject on which this year's committee on publicity concentrated. The outstanding feature of this work was the inauguration and regular distribution of a news service entitled "National Traffic Notes." About 1,500 words are sent out about every ten days to all member companies. This is a national summary of traffic congestion relief news obtained through reading prominent newspapers throughout the country and other sources of information.

Supplementing this news service

has been a series of posters dealing with traffic congestion which have emphasized the point that public transportation vehicles are the most economical users of street space. Samples of posters are shown in the report. One series includes "stop" and "go" signals with a few pointed suggestions to prospective riders pointing out the advantages of street car service. Another series takes up traffic congestion and shows the futility of blocking the streets with parked automobiles. Other posters have been prepared on special topics for various purposes, including appeals to trainmen.

In order to combat misinformation which has been circulated about the country, the committee prepared a leaflet entitled "The Truth About Electric Railway Abandonments." This leaflet told briefly and truthfully the abandonment situation and also emphasized the unfairness of some newspapers in stressing small town abandonments as being of major importance.

A number of other campaigns were carried on during the year, including the reprinting of a number of addresses which have been made before the American Electric Railway Association and other bodies, and the 10-to-4 shopping campaign. Several new series of advertisements have been prepared for use by electric railways during the year, motion picture films have been distributed and there are now about 30 reels available covering seven subjects. New scenarios are now being prepared.

Resolutions on the Death of

Nicholas F. Brady

YOUR committee appointed to draft a memorial to the late Nicholas F. Brady presents, with recommendation for its adoption, the following:

Men in the utility field and in public life were greatly affected at the news of the death on March 27 of Nicholas F. Brady. In his death there passed a national figure—a man of outstanding business attainments, one wise in his benefactions, a devoted churchman, wide in his sympathies and considerate by his tolerance. As for the utility industry, his death removed one of its stanchest adherents. Modest in demeanor, Mr. Brady worked unceasingly to the attainment of corporate projects, but he never lost sight of the human factor upon which they depend for success. Aside from the part that he played directly in the electric railway industry through his various directorships and as an active participant in the affairs of this association, notably as a member of the Advisory Council from its inception, he contributed liberally to the promotion of the humanitarian side through his sponsorship of the Brady Awards, authorized early in 1914 by the family of the late Anthony N. Brady, but subsequently modified to make them more inclusive and revived by him after the wartime period.

Lasting in their impress are these awards made annually by the American Museum of Safety of a gold medal, a silver medal, and a bronze medal to those electric railways which for the year of the awards were judged to have done the most in their respective classes to conserve the safety and health of the public and the employees.

But keen as was his interest in these awards, it was only one of the man's many activities. Never did he lose sight of the complementary aspects of capital and labor. And nowhere was his appreciation of the responsibility of his stewardship better illustrated than the work he did with the National Civic Federation. High corporate, civic and spiritual honors were his because he built up character as well as riches. His corporate work, his benefactions and his humanitarianism proclaimed the man. In his death the American Electric Railway Association lost a wise counselor. It desires now publicly to acknowledge its debt to a benefactor by entering this resolution on its records and directing that a copy of it be sent to his family.

Respectfully submitted,
Lucius S. Storrs, *Chairman*.
F. R. Coates,
George J. MacMurray,
Committee on Resolutions.

The Pacific Coast Offers Splendid Beach Recreation

Bathing beaches near Los Angeles visited by A.E.R.A. delegates on their trip to southern California

Many Engineering Committees Prepare Reports

COMMITTEE work of the Engineering Association has been proceeding steadily. Much of it has been in progress over a period of several years and thus it was possible to prepare reports for presentation at the convention. The following brief abstracts give a condensed summary of the work accomplished.

Heavy Electric Traction

FROM a review of manual section D 100-14, it appears that existing standards for pantograph trolley clearances have been materially outgrown. It is planned to make a study in co-operation with the American Railway Association leading to a revision of this manual section. A specification was submitted for stud terminal rail bonds, which was prepared jointly with a subcommittee of the electrical section of the A.R.A., and which has been approved by the principal manufacturers. The welding of third rails, together with the use of other substitutes for copper bonding, has received consideration and will be developed during the coming year.

Considerable comparative information on oil-electric locomotives has been collected. It also is hoped to prepare a tabulation of operating statistics for these locomotives, and material is now being collected. Further information has been collected on the subject of articulated train operation, and the data sheet giving information on the subject has been revised. This year the locomotive tabulation was given only for machines which were not incorporated in last year's report. It is the plan of the committee now to prepare a complete report on electric locomotives every fifth year only.

Chairmen of Engineering Association Committees

1. L. C. Winship, Heavy Electric Traction.
2. E. M. T. Ryder, Editing of Proceedings.
3. L. D. Bale, Engineering Manual; Subjects.
4. C. A. Smith, Electric Railway Journal Maintenance Contest.
5. F. H. Miller, Nominations; Program.

Power Division

Power Division Committee Chairmen

1. H. F. Brown, Ferrous and Non-Ferrous Materials.
2. A. J. Klatte, Trolley Voltage Surveys.
3. W. E. Bryan, Power.
4. H. W. Codding, Mercury Power Rectifiers.
5. J. F. Neild, Power Supply for General Purposes.
6. R. H. Rice, Power Contracts.
7. D. L. Smith, Catenary Specifications.
8. H. S. Murphy, Trolley Wire Wear.
9. J. W. Allen, Manual Review.
10. A. Schlesinger, Lightning Protection.

John Leisenring, Distribution System.

L. R. Wagner, Trolley Construction Specifications.

Manual Review—Several of the specifications of this division were reviewed and recommended for revision. An appendix gives considerable information on the subject of trackless trolley.

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Power Rectifiers—Further operating experience was tabulated and summarized, using the standard log sheet published in the 1928 report. Additions to the bibliography were made, bringing it up to date. It is stated that the installed capacity in rectifiers for the eight months from May 1 to Dec. 31, 1929, was 165,475 kw.

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Power Contracts—During the year the committee has given its attention to checking details of contracts obtained and preparing from outlines of what a power contract should be. Such an outline is presented as an appendix.

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Power Supply for General Purposes—Use of trolley voltage supply versus commercial current circuits for general illumination of electric railway properties, operation of shop tools, and miscellaneous requirements was studied. The lighting and motor application as used by various properties was reviewed. Data on lamps and lighting practice were submitted by lamp manufacturers and other information was obtained from tests conducted by operating companies. The committee concluded that from an engineering and operating viewpoint the use of commercial current circuits is desirable, while from an economic viewpoint it may be cheaper to use trolley voltage supply, although this should be balanced against the greater efficiency and flexibility of the utilization of commercial circuits.

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Catenary Specifications—Proposed revisions of manual section D 102-29, specifications for overhead line material, were included, as were preliminary reports on the study of alloy and composite messenger cables and insulators for catenary construction. A revised tabulation of catenary installations using copper alloy and composite messengers was given showing details of construction used.

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Trolley Wire Wear—The study of trolley wire wear and breaks, with special reference to breaks due to causes other than normal wear, was continued. It was treated in detail and constitutes the body of the report. Statistical data relative to trolley breaks are brought up to date by including 1929 operating results, and a number of new comparisons covering the period 1922-1929. The committee recommended adoption as standard of the revised specifications for hard bronze trolley wire.

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Specifications for 600-Volt Overhead Trolley Construction—A progress report only was made. This committee is preparing a revision of manual section D 101-16, which it is planned to bring in conformity with the fourth edition of the National Electrical Safety Code.

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Lightning Protection—Revision of manual section D 204-15 covering lightning protection for car equipment, stations and line was proposed, as was a revision of manual section E 207-24, in so far as it relates to the same subject.

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Distribution Systems — Investigation of the comparative cost and reliability of overhead and underground direct current distribution systems was made. The report presents a tabulation which gives some interesting data on the subject. The advantages and disadvantages of the two methods of distribution are gone into in some detail.

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Ferrous and Non-Ferrous Materials—This report covers principally ferrous and non - ferrous materials used for overhead construction. An analysis was made of the various methods used for protecting ferrous materials, such as coating with other metals, painting, electroplating, and chemical treatment.

Rolling Stock Division

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Rolling Stock Division Committee Chairmen

1. H. H. Adams, Car Design.
2. H. S. Williams, Noise Reduction.
3. T. H. Nicholl, Rolling Stock.
4. P. V. C. See, Motor Coaches.
5. Hugh Savage, Current Collecting Devices.
6. W. T. Vivian, Limits of Wear.
7. R. W. Cost, Lighting.
8. J. H. Lucas, Lubrication.
9. E. J. Jonas, Fire Hazards in Shop Practices.

W. C. Bolt, Manual Review.

Motor Coaches—Due to the rapid changes of the industry the committee made no effort to standardize coach design. It did, however, draw up a code for making static tests of bus bodies, which is included as an appendix. It is also working on the determination of how frequently buses should be overhauled. Specifications for motor coach lubricating oils were proposed. Maximum possible rates of retardation were studied, and a tabulation showing the length of life obtained with various brake linings by the Cleveland Railway was included as an appendix.

◆

Car Design—A study of car equipment with special reference to appearance, comfort, ventilation and convenience was continued. Particular interest centered around the tests of several types of car trucks. These tests, which were begun more than a year ago, were continued. Charts showing the results up to the present are incorporated in the report.

◆

Lighting—Studies on the subject were continued during the year. Investigations were made on the use of dash illuminating headlights. Recommendations were given on interior color finishes for cars, burning position of lamps and the prevention of reflections on the windshield of the car due to the interior lighting. Recommendations were also made on the installation of lighting fixtures under interior baggage racks of motor coaches.

◆

Lubrication—Four reports of experimental work being done in connection with the use of light viscosity oils have been received by the committee. Since there was considerable variance of opinion, the committee has presented a report of progress only and has not made public the data received.

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Fire Hazards in Shop Practice—Study of fire prevention with special reference to spraying nitrocellulose lacquer and other inflammable finishing materials used in railway car painting was continued. It was pointed out that certain of the rules of the N.F.P.A. are inconsistent.

◆

Noise Reduction—Further tests were made on a new type of cushion car wheel and comparisons made with a standard car wheel. These showed the improvements as regards noise obtained by use of the cushioned wheel. Tests were also made to show the value of celotex as a soundproofing medium compared with felt.

◆

Limits of Wear—An effort was made to arrive at some reasonable limits of wear on car journals, journal boxes, bearings and pedestal guides, both from the standpoint of the operator and from calculations. Maximum allowances have been selected which would not permit trucks and axles to rotate through a sufficiently large angle to allow the wheel flanges to drag on the rail. Definite limits of wear for railway motors and truck parts were recommended.

Way and Structures Division

Way and Structures Division Committee Chairmen

1. C. L. Hawkins, Track Construction.
2. E. M. T. Ryder, Special Trackwork.
3. C. A. Smith, Way and Structures; Wood Preservation.
4. C. H. Clark, Track Gage.
5. C. F. Gailor, Arc Welding.
6. S. C. Baker, Pavement.
7. H. S. Williams, Rail Corrugation.
8. C. A. Alden, Rails.
9. W. R. Dunham, Jr., Manuel Review.
10. M. W. Rew, Motor Bus Garage Design.

J. I. Catherman, Weed Elimination.

P. A. Kerwin, Alloy Steels for Special Trackwork.

P. J. Mitten, Wheel and Rail Contours.

W. A. Underwood, Foundations for Special Trackwork.

Manual Review — Recommendations were made to bring manual section W 25-23, specification for steel track spikes, in line with the latest specifications of the A.S.T.M. on the same subject. A change of manual section W 11-21, standard dimensions in switches and mates, was also recommended.

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Special Trackwork—Study of the design of tongue switches was continued. Designs were submitted with the report for a 75-ft. lateral, a 100-ft. equilateral, and for 9 in. deep work. A design for expansion joints and girder rail to be used in paved track was worked out but was not submitted as the committee desired also to work out a design for use in open track before reporting.

◆

Wheel and Rail Contours—A study of cylindrical wheel treads versus conical wheel treads in conjunction with flat head versus curved head rails was taken up. The committee has attempted to determine the reason for the use of a conical tread, to locate properties where a cylindrical tread has been tried, and to obtain information as to the results of such trials. The history of the conical tread was traced from the earliest days of railroads. While only one American electric railway property was located on which cylindrical treads are used, there are several in Europe.

◆

Wood Preservation — Specifications for the maintenance of pole timber and structures were presented. Further studies of the actual economies obtained through the use of treated timber were reported on. The study of wood preservatives other than creosote and zinc chloride is becoming more important, and it was continued. Possibilities of a combination preservative and fire preventive treatment for timber was given consideration. It is believed by the committee that with increased use, the relatively high cost of the fire-proofing treatment can be reduced. Preservative treatment for timber for use in car construction and maintenance was discussed.

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Arc Welding—Studies were made of various types of welding rods. A report was submitted giving proposed rules and instructions for training welding personnel. The committee also has given considerable thought to the collection of all available welding information which would be of any interest or use to electric railway employees.

◆

Alloy Steels for Special Trackwork—A group of tests was undertaken on surface welding of the three types of alloy steels now in use in special trackwork and to complete the work started last year in the investigation of thermit welding of chrome-nickel steel. A detailed description of the tests and the results obtained is given. The results of the several tests on surface welding of alloy steel were averaged and tabulated so that a comparison may be made conveniently and conclusions drawn. Another subcommittee developed a method for making wear measurements on individual pieces of special trackwork installations, so that all wear data should be recorded on a comparable basis. On the subject of heat-treated rail and intermediate manganese rail, it is stated that these materials offer interesting possibilities along the line of increased hardness, wearing qualities and resistance to rail corrugation.

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Pavement—It is believed that in view of the large expenditures for paving and of the increasing demands of vehicular traffic and increased cost of this part of the track structure, up-to-date information should be secured and made available to way engineers.

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Motor Bus Garage Design—A proposed outline of operating bus garage layouts was made, so that the operator may determine from it the various elements that are necessary in producing a satisfactory garage for bus service. It was recommended that the outline be approved as recommended practice for inclusion in the Engineering Manual.

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Rail Corrugation—A voluminous report was presented. It contains a collection and study of data pertaining to deflections under load and of the computed probable vibrations resulting from these deflections. The study shows that paved track is much stiffer than open track, and that in paved track the natural period of vibration is a probable contributing cause to rail corrugation. A short study of car nosing, together with a presentation of the data which the committee has collected, was made. Indications are that the effects of nosing may momentarily increase wheel loads by as much as 50 per cent. The report also includes summaries of the work done by the Canadian and the International Association committees on the same subject.

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Rails—Branding rails was discussed, and it was recommended that the subject be continued. Manual section W 16-24, specification for carbon steel rails of standard section, was reviewed and was submitted to the association for letter ballot. The relation between rail wear on a given section of track approaching stops and between stops was studied to develop the connection between the amount of such wear and the volume of traffic, weight of equipment, rate of speed, etc. Fishing between the association's standard 7-in., 122-lb., grooved girder rail and the standard 7-in., 140-lb., girder guard rail was investigated.

Purchases and Stores Division

Manual Review—Several revisions of the Engineering Manual sections dealing with this subject were proposed. No changes are recommended in the classification of scrap material. The committee has prepared an index for the A.E.R.E.A. classification for materials and supplies. This is submitted as an appendix.

◆

Investments in Materials and Supplies at Cost of Operating Stores—A study was made to determine what is included in the account of materials supplied by the various member companies, what is charged to the account of stores expenses, what is the relation of stores expenses to gross earnings and other items, and what are the physical or operating circumstances which have a special influence on the subject. A questionnaire was sent out and replies are now being received. It was not possible to draw deductions from these in time for the convention.

◆

Standardization and Simplification of Stock—This committee has only recently been organized and arrangements are being made to obtain information on the subject.

◆

Materials and Supplies Control—The importance of proper control of stocks was stressed by the committee. Recommendations were made relative to proper methods of handling stock.

1. C. A. Harris, Standardization and Simplification of Stock.
2. W. E. Scott, Unit Piling and Standard Packages.
3. A. L. Fischer, Purchases and Stores.
4. W. S. Stackpole, Stores Investment and Costs.
5. A. A. Ordway, Pricing Methods and Records.
6. J. Fleming, Manual Review.
7. E. F. Kelley, Material and Supplies Control.

Purchases and Stores Division Committee Chairmen

T. & T. Committees Active

Five committees of the American Electric Railway Transportation and Traffic Association were continued during the past year for further study, research and collaboration. The available time for study was foreshortened but all of the committees made real progress in the subjects assigned. A sixth committee, covering the subject of operating economics, was created in the belief that an assignment of this scope would be beneficial and profitable. This report, along with five others that were completed, are herewith presented.

TRANSPORTATION EMPLOYEE

ANALYSIS of the transportation job, with the correlated subsequent supervisory and employee training, and a study of proneness to accidents are the items to which special attention is given in the report of this committee. The study of accident proneness covers several factors affecting efficient operation, although it is recognized that accidents comprise the more definite unit for measuring the faults. In seeking the fundamental cause for this proneness, the committee found a need for improved selection of trainmen and coach drivers, proper choice of the supervisory employee, and better training of both.

For the subject of accident proneness the committee concludes that there is definite need for intensive supervisory training and job analysis, that training should follow job analysis, and that selection and training of employees should be given greater study.

Under selection of the transportation employees, the committee discusses the preliminary interview of applicants, high physical standards and testing applicants for proneness to inefficiencies. A good supervisory staff, according to the committee, should be made up of high-grade men, properly trained.

MOVEMENT OF THE VEHICLE

COMMUNITIES and transportation agencies are more keenly aware than ever before of the fact that increasing private automobile usage presents a great and permanent problem. In this report the committee signalizes the work of the electric railways in solving the problem and analyzes the private automobile, parking, signals and traffic control, and equipment.

Under the first subject, the private automobile, the committee concludes that the most severe aspects of automobile competition have not been felt by collective transportation facilities and that the future may show a similar distribution to that now found, with some probable shifts toward collective transportation, with increases in street congestion and with improved transportation methods.

In the section devoted to the parking problem, the committee holds that parking is a privilege that may be tolerated where it does not interfere. It should be regulated to promote safety and an equitable distribution of space.

SMALL CITY OPERATION

THE report of the committee on small city operation outlined the procedure followed in securing additional data and analyzing the individual subjects of operating methods, merchandising, competition, bus substitution, franchises, operating economies, taxation and financial structure.

Questionnaires covering these were sent out during the year and the results interpreted at a three-day session. Conclusions arrived at in this meeting formed the major part of the committee's report. Among the significant statements were: Properties where most attention has been given to prices and selling service have obtained the best results; transportation must be supplied in the form in which the public wants it and at a price which is competitive; merchandising must go farther than advertising, the entire organization must be groomed to sell the service; buses offer several advantages which must not be overlooked; results of several companies indicate it is possible to adjust operating expenses to a very low level of earnings.

"There is no magic formula for the success of the small-city transportation property," the report concludes; "Individual conditions are controlling and must be expertly analyzed. The management cannot miss a single opportunity to provide joint service, secure added economies, or improve operating conditions. The greatest need is for skilled merchandising and all that is implied by it."

OPERATING ECONOMICS

FIVE broad subjects are covered by this committee: (1) Those operating practices which have been found beneficial on one or more properties, (2) use of one-man cars, (3) substitution of buses for street cars, (4) business-getting, and (5) fares.

In analyzing operating practices the committee sets forth those applications of modern methods and practices which will, first, increase the gross revenue of the operating company, and second, decrease the operation of maintenance costs.

Some companies have succeeded in stopping the annual decline, and in several outstanding examples have actually increased their riding and revenue during the past few years. The ways and means of accomplishing this satisfactorily are listed.

The operating practices which have resulted in decreased cost for operation and maintenance, as listed in the report, are those which, because of the fact that the individual saving may be relatively small when expressed as a percentage of gross revenue, are frequently overlooked but which, taken as a whole, represent a substantial saving to the industry.

On the subject of one-man cars, the committee expresses the opinion that the substitution of one-man cars for two-man cars has become more than a trend and that there are very few, if any, street car lines, except perhaps in the very largest cities, that cannot be successfully operated with one-man cars.

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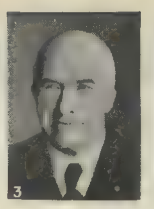
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Chairmen of Transportation and Traffic Association Committees

1. C. W. Wilson, Movement of the Vehicle.
2. W. H. Boyce, Nominations.
3. C. A. Smith, Way and Structures; Wood
4. J. R. Ong, Operating Economics.
5. A. C. Spurr, Small City Operation.
6. L. C. Datz, The Equipment.
7. C. D. Smith, Transportation Employee.

W. W. Holden, The Passenger.

For the purpose of its study of the economics of bus substitution for street cars, the committee cautions against the comparison of modern buses and old-fashioned street cars, and suggests that an estimate be made of what savings in operating costs could be made by the use of modern cars.

To determine the extent to which aggressive merchandising methods are now being employed, a questionnaire letter was sent out. A decided declaration was made by many of the companies that a high quality of service must be maintained before results can be obtained from merchandising methods.

The study of fares was confined to an examination of the trend in revenue passengers in eight cities of the United States, each with more than 500,000 population, from 1926 to and including 1929. The results are presented graphically and analyzed in some detail.

THE PASSENGER

DETERMINING the education of the public in general as well as the patrons of public transportation toward the service which electric railways are rendering was considered a necessary field of investigation by this committee. Accordingly it organized and started a plan of research to find out why people use or do not use public transportation. This might be termed a quantitative or market analysis.

To establish a scientific and uniform method of making market analyses the electric railways selected a man with considerable experience in this work, Dr. W. J. Reilly, to visit a number of different properties and to assist and instruct them in the making of such an analysis. The plan is for Dr. Reilly to spend a period of from two to four days in instructing the local men in the methods of securing information and analyzing results. A sufficient number of companies accepted the plan to assure its accomplishment, but the work had not progressed sufficiently at the time of the report to present the final results.

EQUIPMENT

THE effect on revenues and operating expenses of new and rehabilitated cars; the size, type and character of units most suitable for various classes of service, and the accessories necessary for the safe and convenient operation of buses and trolley buses, are the individual subjects covered by the committee on equipment.

The first subject is divided into two parts, the effect on revenue, and the effect on the maintenance and operation accounts.

The facts developed by a study of individual cases where new cars were substituted for older equipment, together with the general comparison of 81 companies, 41 of which had new cars, admits of but one conclusion—new cars or cars that have been modernized increase passenger revenue by an appreciable per cent.

It is claimed that (1) operation of light-weight, modern cars shows a saving in power; (2) new cars increase schedule speed; (3) operation of modern cars reduces platform costs; (4) maintenance of modern cars is not only less for the first few years but also remains lower than for the old type of cars; (5) lighter cars show a saving in maintenance-of-way; and (6) safety features of new cars result in fewer accidents.

The recommendation is made on bus equipment that standard heating and ventilating systems and standard accessories be developed as parts of body design.

ACCOUNTANTS' and CLAIMS *Associations Active in Committee Work*

Both the Accountants' Association and the Claims Association committees prepared useful reports during the year. The former association completed several investigations which could not be finished in time for the Atlantic City convention last fall, at which time only reports of progress were made. The Claims Association continued with the same committees which have been functioning for some time.

Abstracts of the reports made public are published in the following paragraphs.

STANDARD CLASSIFICATION OF ACCOUNTS

DURING the past few years several interpretations of interest have been issued by the bureau of accounts of the Interstate Commerce Commission, and as these interpretations have not been published, the committee's report consisted principally of an appendix in which these rulings were set forth in detail. In the matter of the "unit of property," it has been ruled that the term should be restricted to property items the cost of which are ordinarily recorded separately in the property accounts. An important section of a continuous structure should include all of the elements of that particular structure and should not be applied to only one factor of the same. For instance, the complete electric motive equipment of a car should be considered a unit. Rails and paving are but factors of a continuous structure, and the accounting pertaining to the replacement thereof, where betterment is involved, is specifically provided for in the interpretations. The report of the committee, together with the appendix, should do much to clarify many disputed points in accounting procedure.

Chairmen of Accountants' Association Committees

1. Walter Shroyer, Freight Accounting.
2. T. P. Kilfoyle, Nominations.
3. M. W. Glover, Standard Classification of Accounts.
4. H. R. Bowie, Stores Accounting.
5. R. G. Smith, Budgetary Control.
6. W. L. Davis, Representative at Accountants' Association at Annual Convention of National Association of Railroad and Utilities Commissioners.
7. E. A. Tuson, Bus Accounting Subcommittee of Standard Classification of Accounts; Fare Collections.

R. O. Crowe, Subjects.

With a view to ascertaining the extent to which its recommendations had been adopted, the subcommittee on bus accounting had circularized the industry with the aid of the association's headquarters staff. From the replies received it would appear that the classification, slightly modified, is being adopted by a great majority of member companies, as well as by a considerable number of state regulatory bodies. The returns indicate that there is a heavy preponderance of opinion in favor of setting up a separate group of accounts for retirement expenses, but opinion on rentals was about evenly divided. Preliminary discussions have been held with the bureau of accounts of the Interstate Commerce Commission looking toward the promulgation of a classification for motor bus operating companies by that body. A mutually satisfactory understanding appears to have been arrived at, and a classification has been tentatively framed which will be in harmony with the committee's standard classification, as well as with that adopted by the National Association of Railroad and Utilities Commissioners.

BUDGETARY CONTROL

THE purpose of the budgetary control committee has been to determine the extent to which budget systems are now being used by member companies, and to devise a standard form of budget procedure in case there should appear to be any need for it. A widely circulated questionnaire was responded to by comparatively few companies, but the replies received indicated that a considerable number of properties already have budget control of revenues, operating expenses, cash requirements, taxes, and construction expenditures. The general impression gained from the replies returned was that the companies making use of the budget system find it extremely helpful and have experienced no disadvantage other than the expense of maintaining the necessary records. It is, perhaps, significant that only two companies discontinued budget systems after they had once been established.

Of the 93 companies replying to the questionnaire, 54 indicated that a further detailed study by the committee should be recommended. Reference was also made in a considerable number of replies to the excellent work of a similar committee of the National Electric Light Association, with the recommendation that if further study is to be carried on by the committee, the work of the N.E.L.A. committee should be carefully studied.

BUS ACCOUNTING

SINCE reporting to the last convention, the committee has undertaken the circularization of the country, first, to obtain accurate information as to the use of the association's bus classification; second, the extent of its official adoption by regulatory bodies; and, third, the attitude of bus operating companies toward the changes proposed in the classification as to rentals and retirement expenses in the committee's reports to the last two conventions.

Information has been received from all but three states, and it has been found that the committee's classification, slightly modified in some instances, has been adopted by Maryland, New Jersey, Missouri, Vermont, Georgia, Oklahoma, Alabama, Florida, Wisconsin, Tennessee and the District of Columbia. Minnesota also accepts reports filed upon the basis of this classification as well as another classification promulgated by the state.

Of the other states, only Pennsylvania and California have adopted classifications designed to cover major bus operations, although eleven other states have classifications for the use of small operators. Three states, Texas, Iowa and Wyoming, were not heard from, twenty have no standard classification, and Delaware has no state regulatory body.

The committee finds further that of the member companies circularized nearly all use its classification except the Pennsylvania and California companies.

The response to the inquiry for opinions on the proposed changes in the classification resulted in a heavy preponderance in favor of setting up a separate group of accounts for retirement expenses. The vote on rentals was evenly divided.

Preliminary discussions have been held with the bureau of accounts of the Interstate Commerce Commission looking toward the promulgation of a classification for motor bus operating companies by that body. A mutually satisfactory understanding seems to have been arrived at and a classification has been tentatively framed. This classification will be in harmony with the standard classification, which has already been adopted by the National Association of Railroad and Utilities Commissioners.

SAFETY

IN PRESENTING its report wherein it was recommended that the safety committee of the Claims Association be discontinued, the committee took the view that the interest of the Claims representatives in the subject of safety arise only after the occurrence of accidents, and that accident work is usually in the hands of specialists, in consequence of which there was no need for a safety committee organization within their association. Those members of the association who are taking an active interest in accident prevention work upon their properties, according to the report, attain success only where managements and other operating departments give wholehearted co-operation in such efforts. The committee held, further, that there can be no success in any accident prevention work without the co-operation of managements and other operating departments.

The committee made the further recommendation, however, that a safety committee be appointed by the American Association, with a membership to be composed of representatives of managements and the several operating departments, including the claims departments. Such a committee, according to the report, would limit its activities to actual safety matters, such as legislation in the interest of safety, dissemination of information regarding safety devices, standardizing protection for crossing and train operation, etc., omitting further consideration of such matters as uniform classification, uniform accounting, chargeable and non-chargeable accident definitions, and other such matters not actually concerned in real accident prevention.

CLAIMS DEPARTMENT PRACTICES

THE committee on claims department practices pointed out in its report that the non-uniformity of practice makes it impossible for properties to compare results and thereby profit by an interchange of information. A recommendation put in the form of a motion for the appointment of a representative committee to standardize all claims department reports was unanimously passed.

Chairmen of Claims Association Committees

1. Wallace Muir, Nominations.
2. J. S. Kubu, Uniform Negligence Law.
3. J. H. Handlon, Subjects.
4. B. C. Wood, Claims Department Practices.
5. P. W. Klabunde, Safety.

Downtown San Francisco

Considerable preliminary work was done by the committee and a questionnaire was sent out. Replies were received from a considerable number of representative companies, but it was felt that only a report of progress should be made at present.

UNIFORM NEGLIGENCE LAW

IN ITS report on the uniform negligence law the committee made it plain that it had confined its endeavors to an attempt to determine the constitutionality of the imputed negligence act, as drafted by a previous committee. Consultation was had with counsel, not alone in the street railway industry but from the steam railroads and the insurance companies as well. The general opinion was that the constitutionality of such a case had practically been established in a recent decision of the United States Supreme Court involving a Connecticut statute which, in effect, released owners of motor vehicles from responsibility for injuries to passengers therein. There remained, however, the question of political interference with the passage of such an ordinance, this being a debative point the committee was unable to solve.

Although commendable progress had been made in classifying procedure, the committee on claim department practices was not in position to render a final report, and asked that it be continued for another year.

How the Convention Guests Were Entertained

Many delegates took advantage of the opportunity for golf

EXTENSIVE planning on the part of the entertainment committee provided a very complete program for the A.E.R.A. delegates and their families while in the convention city and in southern California. Interesting events were scheduled for almost every time of day, and many availed themselves of the opportunity of combining pleasure with business.

Numerous automobile trips, special concerts in the hotel lobbies, and golf were scheduled for every day of the convention. Golf privileges at the principal San Francisco Clubs were extended to registered delegates of the convention.

Automobile trips were made on Sunday afternoon and Wednesday to interesting points in the metropolitan area of San Francisco. The Wednesday trip, planned especially for the ladies. included Taits-at-the-Beach where the party had luncheon. Leaving this interesting spot, the party followed the Skyline Boulevard down the Peninsula to Stanford University, where the famous Stanford Memorial Chapel, the home of President Hoover and the University's huge stadium were viewed. From here the group went to the beautiful Los Altos estate of Mr. and Mrs. Paul Shoup, where tea was served.

On Monday afternoon an informal reception and tea for the ladies was given at the Laurel Court of the Fairmont under the sponsorship of the hostess committee, headed by Mrs. Paul Shoup. In the evening the Advisory Council banquet was held.

Tuesday morning was set aside for shopping tours for the ladies of the convention. Many took advantage of this opportunity to visit some of San Francisco's leading shops, including those in Chinatown. In the afternoon two interesting features were enjoyed, an inspection of the 600-ft. California relief map on the second floor of the Ferry Building, and a boat trip on the San Francisco Bay, extended through the courtesy of E. H. Maggard, vice-president and general manager of Southern Pacific-Golden Gate Ferries, Ltd.

One of the outstanding social events of the convention was held Tuesday evening in the Venetian Terrace of the Fairmont Hotel, portraying "A Night in Hawaii." Nothing was left undone to place the guests in this atmosphere. The feature of the evening was the entertaining by Johnny Nobles' Orchestra from the Royal Hawaiian Hotel at Honolulu and the Hawaiian Girls' Glee Club, featuring Lani Ruttmann, hula dancer in "White Shadows of the South Seas."

An atmosphere of the days of Old California just before and during the discovery of gold in 1849, was provided at the grand ball, held at the Fairmont Hotel Wednesday evening. The decorations were particularly novel and fitting for the occasion and lent much to the effectiveness and enjoyment of this event. During the evening a number of special dances were given, including the tango, a cakewalk, a Spanish waltz, and a spirited adagio. Music for both the Grand Ball and a "Night in Hawaii," was furnished by Anson Weeks' Orchestra of the Hotel Mark Hopkins.

Mention should also be made of the entertainment provided for the delegates en route. The White Special, leaving Chicago on the evening of June 17, made stops at St. Paul and Portland. Many availed themselves of the opportunity to see the Twin Cities in a bus ride from St. Paul to Minneapolis. At Portland, the party was royally entertained for a full day by the Pacific Northwest Public Service Company. A 200-mile automobile trip along the Columbia River scenic highway to Hood River occupied most of the day. On the return, the party stopped at Eagle Creek for a mountain trout barbecue.

The Red Special party was entertained at St. Louis, Kansas City, Colorado Springs, and Salt Lake City. At the first city, the delegates were taken to inspect the Lindbergh trophies and to hear part of the Municipal Opera program. At Kansas City the delegates were given a breakfast at the Kansas City Athletic Club and shown the points of interest in the city.

Near-by spots of scenic beauty were visited at Colorado Springs via automobile. A five-hour stop was made at Salt Lake City, permitting the party to inspect the trolley bus system there and view several interesting places. The Blue Special was scheduled for making the trip in a minimum of time and had no stopovers.

Friday found a number of delegates at Del Monte for the A.E.R.A. Pebble Beach eighteen-hole medal handicap golf tournament. Ephraim Brown, Ohio Brass Company, won with 79. Others spent the day at the Yosemite Valley.

Almost 300 enjoyed the tour of Los Angeles and vicinity on Saturday. Among the places visited in the morning were the city hall, Elysian Park, Luna Zoo, San Gabriel Mission, Pasadena residential districts and Glendale. At noon members of the party were entertained at Fryman Rancho with an old fashioned Spanish barbecue. Individual buses then went to the motion picture studios where the party saw how sound films are made by Metro-Goldwyn-Mayer, First-National, Warner Brothers and Pathé. The trip was concluded with a visit to the beaches, to Beverly Hills and to the outlying residential suburbs.

That evening there was a farewell reunion in the nature of a dinner dance at Brandstatter's famous cafe, Montmartre, Hollywood, participated in by 34 members of the party.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
April, 1930..........	798,970	637,121*a*	....	131,849	76,480
April, 1929..........	829,328	697,827	....	131,501	68,908
12 mo. end. Apr., 1930	9,571,797	7,997,225*a*	....	1,574,572	883,163
12 mo. end. Apr., 1929	9,632,131	8,256,047	....	1,376,084	757,843
May, 1930..........	792,536	675,407	....	117,129	61,527
May, 1929..........	819,405	683,499	....	135,906	77,101
12 mo. end. May, 1930	9,544,929	7,989,134	....	1,553,795	867,590
12 mo. end. May, 1929	9,610,060	8,229,538	....	1,380,522	646,735
Northwestern Pacific R.R., San Francisco, Cal.					
April, 1930..........	434,145	446,367	35,854	*48,076*	*55,856e*
April, 1929..........	432,399	462,699	38,236	*68,540*	*68,419e*
5 mo. end. Apr., 1930	1,580,812	1,728,614	145,002	*292,947*	*310,242e*
5 mo. end. Apr., 1929	1,653,842	1,773,673	152,945	*272,823*	*282,470e*
Capital Traction Company, Washington, D. C.					
April, 1930..........	375,237	260,692	29,868	87,396	57,675
April, 1929..........	380,996	254,470	31,691	99,196	68,451
4 mo. end. Apr., 1930	1,415,143	1,018,405	109,344	294,350	174,221
4 mo. end. Apr., 1929	1,452,391	1,011,768	114,096	335,619	216,386
May, 1930..........	369,413	256,036	29,934	83,746	53,985
May, 1929..........	389,304	263,059	32,076	94,727	64,814
4 mo. end. May, 1930	1,784,556	1,274,441	139,278	378,097	228,206
4 mo. end. May, 1929	1,841,695	1,274,828	146,172	430,347	281,200
Jacksonville Traction Co., Jacksonville, Fla.					
April, 1930..........	91,163	71,000	9,115	10,415	....
April, 1929..........	97,394	77,495	9,153	10,268	....
12 mo. end. Apr., 1930	1,115,767	910,325	107,314	91,721	*65,138*
12 mo. end. Apr., 1929	1,183,310	955,306	106,735	114,758	*46,707*
Honolulu Rapid Transit Company, Honolulu, T. H.					
April, 1930..........	85,064	46,271	8,819	29,974	18,295
April, 1929..........	87,658	51,783	10,616	25,259	15,054
4 mo. end. Apr., 1930	344,390	206,351	35,277	107,086	58,688
4 mo. end. Apr., 1929	354,598	203,715	42,464	113,007	68,114
May, 1930..........	88,437	50,810	8,819	31,008	19,704
May, 1929..........	88,382	51,892	7,932	29,569	18,346
5 mo. end. May, 1930	432,827	257,161	44,096	138,095	78,392
5 mo. end. May, 1929	442,981	255,608	50,395	142,578	86,461
Chicago Surface Lines, Chicago, Ill.					
May, 1930..........	5,012,190	3,986,513*a*	....	1,025,677	831,499*d*
May, 1929..........	5,354,248	4,157,362*a*	....	1,196,885	902,826*d*
United Railways & Electric Co., Baltimore, Md.					
April, 1930..........	1,449,416	974,816	143,143	341,249	67,093
April, 1929..........	1,423,427	969,800	134,569	332,099	43,876
4 mo. end. Apr., 1930	5,706,277	3,892,272	563,994	1,296,243	190,549
4 mo. end. Apr., 1929	5,558,852	3,827,834	553,037	1,233,594	97,222
May, 1930..........	1,457,181	982,696	142,669	341,491	73,214
May, 1929..........	1,463,365	998,615	132,666	346,656	64,753
5 mo. end. May, 1930	7,163,458	4,874,969	706,664	1,637,734	263,763
5 mo. end. May, 1929	7,022,217	4,826,449	685,703	1,580,251	161,976
Boston Elevated Railway, Boston, Mass.					
April, 1930..........	2,813,083	1,934,394	139,186	757,504	54,281
April, 1929..........	2,916,473	1,946,699	147,017	837,141	140,667
May, 1930..........	2,824,945	1,949,483	135,225	882,986	45,824
May, 1929..........	2,978,446	1,990,084	147,965	992,630	148,719
Eastern Massachusetts Street Railway, Boston, Mass.					
April, 1930..........	651,636	418,236	28,046	216,229	47,051
April, 1929..........	716,162	427,669	32,766	280,222	100,085
4 mo. end. Apr., 1930	2,806,526	1,734,076	125,478	986,637	264,167
4 mo. end. Apr., 1929	3,031,473	1,805,468	137,665	1,160,612	387,889
May, 1930..........	663,941	422,804	29,137	222,305	53,076
May, 1929..........	720,540	460,195	31,258	246,558	80,660
5 mo. end. May, 1930	3,470,467	2,156,881	154,616	1,208,942	317,243
5 mo. end. May, 1929	3,752,014	2,265,663	168,923	1,407,170	468,550
Boston, Worcester & New York Street Ry., Framingham, Mass.					
3 mo. end. Mar., 1930	163,752	148,672	4,875	11,341	3,151
3 mo. end. Mar., 1929	160,945	153,471	4,875	3,184	*1,225*
Department of Street Railways, Detroit, Mich.					
April, 1930..........	1,994,861	1,662,884	65,090	281,656	138,595
April, 1929..........	2,342,050	1,911,641	62,504	376,592	250,140
12 mo. end. Apr., 1930	25,125,914	20,083,004	761,208	4,395,767	2,670,144
12 mo. end. Apr., 1929	25,845,185	20,461,626	763,748	4,826,434	3,050,218
May, 1930..........	1,974,359	1,543,263	65,090	390,505	243,875
May, 1929..........	2,355,752	1,894,548	62,504	407,659	272,651
12 mo. end. May, 1930	24,744,522	19,731,719	763,794	4,378,613	2,641,368
12 mo. end. May, 1929	26,133,685	20,751,617	759,288	4,815,578	3,065,729
Kansas City Public Service Co., Kansas City, Mo.					
April, 1930..........	715,707	560,356	41,675	113,675	39,101
April, 1929..........	752,188	....	....	....	62,052
4 mo. end. Apr., 1930	2,903,432	2,254,213	166,700	482,318	182,759
4 mo. end. Apr., 1929	3,046,990	....	....	....	286,723
May, 1930..........	719,705	552,389	41,675	125,640	45,132
5 mo. end. May, 1930	3,622,938	2,806,603	208,375	607,958	227,891
Illinois Terminal Co., St. Louis, Mo.					
April, 1930..........	590,334	399,704	24,000	166,553	131,438*e*
April, 1929..........	599,678	429,009	21,262	149,407	110,337*e*
4 mo. end. Apr., 1930	2,271,906	1,601,240	96,000	574,589	409,296*e*
4 mo. end. Apr., 1929	2,383,240	1,710,053	85,048	588,015	428,056*e*
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
April, 1930..........	71,000	61,116	4,800	10,298	*21,343*
April, 1929..........	82,255	61,939	7,840	13,981	*17,833*
4 mo. end. Apr., 1930	332,725	256,466	19,200	78,204	*46,260*
4 mo. end. Apr., 1929	345,804	250,936	31,360	72,455	*54,288*
Kingston Consolidated Railroad, Kingston, N. Y.					
3 mo. end. Mar., 1930	21,852	21,665	1,249	*225*	*14,242*
3 mo. end. Mar., 1929	24,077	22,398	1,364	1,170	*6,184*

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Brooklyn-Manhattan Transit System, New York, N. Y.					
May, 1920..........	5,229,829	3,250,525	350,512	1,696,873	929,201
May, 1929..........	4,298,360	2,649,404	290,064	1,427,548	686,447
11 mo. end. May, 1930	55,630,953	36,554,791	3,641,508	16,230,339	7,717,543
11 mo. end. May, 1929	44,418,548	28,515,519	3,091,001	13,726,948	5,914,850
Brooklyn & Queens Transit System, New York, N. Y.					
May, 1930..........	2,030,966	1,499,813	115,841	434,594	310,865
May, 1929..........	2,130,026	1,634,626	108,102	409,838	282,503
11 mo. end. May, 1930	21,620,942	16,908,036	1,263,702	3,683,981	2,306,064
11 mo. end. May, 1929	22,082,832	18,190,140	1,178,751	2,952,984	1,542,559
Hudson & Manhattan R.R., New York, N. Y.					
May, 1930..........	1,039,637	509,707*a*	....	529,929	194,759
May, 1929..........	1,069,375	525,763*a*	....	543,612	206,781
5 mo. end. May, 1930	5,262,626	2,606,139*a*	....	2,656,487	982,850
5 mo. end. May, 1929	5,279,986	2,653,651*a*	....	2,626,334	946,164
Interborough Rapid Transit Co., New York, N. Y.					
April, 1930..........	6,276,781	3,893,075	216,482	2,167,223	*161,201c*
April, 1929..........	6,151,493	3,545,832	203,597	2,402,064	607,614
10 mo. end. Apr., 1930	60,628,687	37,706,793	2,093,907	20,827,986	*1,791,551c*
10 mo. end. Apr., 1929	57,748,164	35,335,159	2,011,315	20,401,688	2,411,531
May, 1930..........	6,287,149	3,879,238	216,201	2,191,708	*144,798*
May, 1929..........	6,261,572	3,556,702	192,693	2,512,178	645,131
11 mo. end. May, 1930	66,915,835	41,586,031	2,310,109	23,019,694	*1,936,350*
11 mo. end. May, 1929	64,009,737	38,891,861	2,204,009	22,913,867	3,056,662
Long Island Railroad, New York, N. Y.					
April, 1930..........	3,123,136	2,247,085	202,560	673,273	523,097*e*
April, 1929..........	3,230,773	2,260,399	187,022	781,986	621,641*e*
4 mo. end. Apr., 1930	11,778,043	9,104,775	529,505	2,141,594	1,570,685*e*
4 mo. end. Apr., 1929	11,937,030	8,941,750	488,888	2,495,927	1,929,832*e*
New York, Westchester & Boston Railway, New York, N. Y.					
April, 1930..........	214,672	116,322	25,071	73,852	*158,947*
April, 1929..........	203,585	127,361	23,350	53,558	*160,516*
4 mo. end. Apr., 1930	824,224	463,478	98,918	264,659	*654,723*
4 mo. end. Apr., 1929	767,041	495,413	81,655	182,707	*660,234*
May, 1930..........	230,781	123,922	....	81,510	*148,173*
May, 1929..........	223,109	121,624	....	78,409	*137,370*
5 mo. end. May, 1930	1,055,005	587,400	....	346,170	*802,897*
5 mo. end. May, 1929	990,151	627,037	....	261,116	*797,605*
Staten Island Rapid Transit Co., New York, N. Y.					
April, 1930..........	198,184	152,662	17,000	28,492	34,026*e*
April, 1929..........	218,841	173,812	17,000	28,026	*9,035e*
4 mo. end. Apr., 1930	762,095	599,381	69,500	91,642	70,755*e*
4 mo. end. Apr., 1929	907,371	685,394	72,000	149,966	3,237*e*
Third Avenue Railway System, New York, N. Y.					
April, 1930..........	1,236,554	932,377	94,071	227,886	12,657
April, 1929..........	1,317,640	993,551	83,031	260,523	811
10 mo. end. Apr., 1930	12,553,690	9,670,687	894,454	2,180,946	*302,676*
10 mo. end. Apr., 1929	12,888,649	9,929,938	899,763	2,247,246	*313,670*
May, 1930..........	1,291,409	956,965	86,589	265,649	58,138
May, 1929..........	1,387,522	1,039,778	88,035	278,698	31,551
11 mo. end. May, 1930	13,845,300	10,627,653	981,043	2,446,596	*244,537*
11 mo. end. May, 1929	14,276,172	10,969,717	987,798	2,525,944	*281,618*
Philadelphia & Western Railway, Norristown, Pa.					
April, 1930..........	58,701	51,519*b*	....	....	7,182
April, 1929..........	68,301	53,813*b*	....	....	14,488
4 mo. end. Apr., 1930	233,640	208,121*b*	....	....	25,528
4 mo. end. Apr., 1929	259,795	213,618*b*	....	....	46,177
May, 1930..........	61,065	....	....	....	8,504
May, 1929..........	69,139	....	....	....	14,047
5 mo. end. May, 1930	294,713	....	....	....	32,033
5 mo. end. May, 1929	328,933	....	....	....	58,226
United Electric Railways, Providence, R. I.					
April, 1930..........	563,595	475,039	34,687	53,867	2,838
April, 1929..........	611,247	478,169	34,906	98,171	47,143
4 mo. end. Apr., 1930	2,339,923	1,971,707	138,833	229,382	24,089
4 mo. end. Apr., 1929	2,495,407	2,008,484	139,627	347,495	143,687
Galveston-Houston Electric Co., Houston, Texas					
April, 1930..........	41,348	24,809	2,608	13,929	....
April, 1929..........	47,074	27,891	2,569	16,613	....
12 mo. end. Apr., 1930	559,805	319,833	32,557	207,606	*61,938*
12 mo. end. Apr., 1929	622,577	340,155	31,684	240,741	*29,998*
Houston Electric Co., Houston, Texas					
April, 1930..........	261,403	165,549	22,485	73,369	....
April, 1929..........	280,506	170,401	24,712	85,391	....
12 mo. end. Apr., 1930	3,317,103	2,064,935	264,811	1,005,982	615,008
12 mo. end. Apr., 1929	3,378,329	2,088,813	287,696	1,001,818	594,874
Pacific Northwest Traction Co., Seattle, Wash.					
April, 1930..........	76,713	55,727	5,298	15,686	....
April, 1929..........	69,201	56,981	4,944	7,274	....
12 mo. end. Apr., 1930	991,308	718,416	55,317	227,572	112,694
12 mo. end. Apr., 1929	884,826	747,440	52,372	85,012	*46,098*
Edmonton Radial Railway, Edmonton, Alta.					
April, 1930..........	66,384	45,298	....	21,086	*1,641*
April, 1929..........	72,172	45,226	....	26,945	1,097
4 mo. end. Apr., 1930	304,775	191,710	....	113,064	5,996
4 mo. end. Apr., 1929	306,222	180,369	....	125,852	14,960
May, 1930..........	63,775	46,729	....	17,046	*2,681*
May, 1929..........	65,923	44,079	....	21,844	996
5 mo. end. May, 1930	368,550	238,439	....	130,111	3,315
5 mo. end. May, 1929	372,146	224,449	....	147,697	15,956

a Includes taxes. *b* Includes operating expenses, taxes and income deductions. *c* Amount by which full 5 per cent Manhattan dividend rental was not earned. *d* Residue receipts after taxes and city's share. *e* Net after rents.

NEWS *of the Industry*

LATE NEWS

Cleveland, Ohio—Opening of through railroad service at Cleveland's new Union Terminals, a $200,000,000 development, was celebrated June 28.

✦

Seattle, Wash.—The Board of Public Works will call for bids for five trackwork layouts for the municipal railway department to cost about $60,000.

✦

East St. Louis, Ill.—Following a hearing on June 17, the Illinois Commerce Commission has under advisement the application of the East St. Louis Railway for a straight 10-cent car and bus fare. Under the new fare the company hopes to get $85,000 a year additional revenue. This would enable it to earn 4½ per cent on its valuation. The city opposed the application.

✦

Paterson, N. J.—The Public Service Commission has approved substitution of buses for trolleys on the run of Public Service Co-ordinated Transport between Paterson and Haledon.

✦

Detroit, Mich.—The proposal to build street cars in its own shops so that employees in the shops of the Municipal Railway may get more than four days' work a week has been rejected by the Detroit Street Railway Commission.

✦

Philadelphia, Pa.—The City Council committee on transportation has approved construction of a $29,000,000 extension of the Market Street subway from Twentieth Street to 46th Street. The measure calls for two tubes under the Schuylkill to replace elevated structure. The committee also has approved the construction of a high-speed line under Locust Street, from Eighth to Eighteenth Streets.

✦

St. Louis, Mo.—The recent survey of downtown traffic conditions made by the St. Louis Public Service Company has revealed widespread violations of the parking laws in the congested districts.

✦

Danbury, Conn. — The Danbury Power & Transportation Company has purchased the White Line Bus Corporation, Inc., Bridgeport, Conn., and has petitioned the Public Utilities Commission for permission to discontinue trolley service between Wentworth Street and Bethany Chapel. A hearing on a petition providing for service by bus over that part of North Main Street was set for June 30. A 10-cent fare is asked.

✦

New York, N. Y.—Bids were opened June 28 by the Board of Transportation for construction of the seventh section of the new city subway system in the Bronx. The low bidder, at $2,691,028, was Di Marco & Reimann.

Voters Approve New Chicago Unification Franchise

$200,000,000 Must Be Spent Within Ten Years and $65,000,000 Within Three Years. 1,700 New Cars and 300 Buses on Program

CITIZENS of Chicago, by a majority of approximately five to one, on July 1, voted for the transportation ordinance, planned to relieve the congestion in the downtown districts, provide rapid transit to far outlying points and furnish transportation to districts heretofore practically isolated.

The ordinance provides for a merger of the elevated and surface lines and various feeder buses. Construction of two subways, through which the surface and elevated lines will enter the downtown district, will go far toward relieving the present undesirable congestion.

Seventeen hundred new cars, elevated and surface, and 300 feeder buses are also included in the program.

The ordinance requires the transportation companies to expend $200,000,000 in extensions and improvements in the next ten years, $65,000,000 of which must be spent in the first three years after its adoption and acceptance. Financial experts who assisted the city aldermen and lawyers in the framing of the ordinance, have stated that in their opinion the necessary money can be raised, as the financial setup is on a sound basis.

Chicago has talked for a quarter of a century on the need for subways in the downtown district to provide additional trackage. The ordinance provides for such subways to be built and owned by the city and operated by the transportation companies. As one commentator put it:

"Rapid transit is the greatest need of Chicago as the city extends its boundaries. It is essential for the people to be able to travel from one section of the city to another in the least possible time, and this service can best be rendered by consolidation of the transportation companies and the co-ordination of elevated, surface and bus lines, as provided in the ordinance."

COMING MEETINGS

July 10 — New York Railroad Club Annual Outing, up the Hudson on the Day Line steamer *Alexander Hamilton.*

July 17-18 — Central Electric Railway Association, the Breakers, Cedar Point, Sandusky, Ohio.

July 23-25 — Electric Railway Association of Equipment Men, Southern Properties, Nashville, Tenn.

July 24-25 — Central Electric Railway Accountants' Association, Cedar Point, Ohio.

Aug. 13-14—Wisconsin Utilities Association, Milwaukee, Wis.

Sept. 17-19 — Canadian Electric Railway Association, 26th annual convention, Ottawa, Canada.

Oct. 29-30—Iowa Electric Railway Association, Des Moines, Iowa.

Renewal of Toledo Grant an Issue

Six charter amendments, among them two aimed to cure defects affecting the street railway franchise renewal, will be submitted at the August primary election. If the charter amendments are carried, renewal of the Milner ordinance under which the Community Traction Company has been operating in Toledo, Ohio, for nearly ten years, will be submitted to electors in November. A provision now in the charter bars renewal of the ordinance except within a year of expiration date. The Milner plan was so drawn that, in case the grant is not renewed, it continues to govern for fifteen years, during which time the property is to be amortized. Another amendment will enable voters to give an exclusive franchise by vote. The present charter bars any exclusive franchise. Under terms of supplementary legislation, the Community Traction Company, now virtually has a monopoly of railway and bus transportation in Toledo.

Accountants to Meet at Cedar Point

Beautiful Cedar Point, near Sandusky, Ohio, will be the scene of the sixty-third meeting of the Central Electric Railway Accountants Association July 24 and 25. "The Breakers" will be the hostelry, and the session on July 25 will be held on the steamer *Chippewa* with luncheon at Put-In-Bay. There will be a dance every night and such other frivolity as golf, boating and bathing, to say nothing of the chances for hilarity at the Amusement Park. L. G. Tighe, president of the Central Electric Railway Association, will deliver the opening address. "Calendar Simplification" will be explained by M. B. Folsom, assistant treasurer of the Eastman Kodak Company, and "Freight Accounting—Your Problem and Mine" will be discussed by C. H. Sellman, auditor freight accounts, New York, Chicago & St. Louis Railway. Write the "Breakers" now for reservations!

LATE NEWS

(*Continued from Page* 486)

Oakland, Cal.—At a meeting of the directors of the Key System Transit Company on June 19, William P. St. Sure was elected a director to succeed the late B. W. Fernald. A. E. Nicoletti, assistant claims agent, has been made claim agent, to succeed Mr. Fernald. Perry Woodcock has been appointed assistant claims agent.

✦

Hartford, Conn. — The Connecticut Company has been authorized by the Public Utilities Commission to substitute service by bus for railway service between Middletown and Hartford. The buses will operate from Gold and Main Streets, Hartford, to the State Hospital for the Insane, Middletown, over a route slightly different from that proposed in the commission's order of April 22.

✦

Kansas City, Mo.—The Kansas City Public Service Company has passed the dividend on the $7 preferred stock due at this time.

✦

Watertown, N. Y.—The Public Service Commission has granted the petition of the Black River Traction Company to abandon 6.33 miles of its 11.33 miles of route in Watertown and the villages of Glen Park, Brownville and Dexter. It is probable that the company would have operated its line outside of the city for some time were it not for the plans of the State Highway Department to construct a state highway that would require the company to move its poles and tracks and to pave between the tracks at a cost of $77,932, an expenditure the company felt unwarrented.

✦

Glendale, Cal.—Application has been made to the Railroad Commission by the Glendale & Montrose Railway for authority to abandon operation of freight and passenger service between Verdugo Road on the south end, La Crescenta on the north, Eagle Rock City on the east, and Brand Boulevard, Glendale, on the west, and to cancel its contract for operation with Los Angeles & Salt Lake Railroad. Competition has made it no longer possible to operate profitably.

✦

Salt Lake City, Utah—Armed with a consent granted by the City Commission, the Utah Light & Traction Company has asked the Public Utilities Commission for a permit to install trackless trolley service on its Warm Springs line. Street cars will be operated as required to the present terminus of the Centerville line, and railway service will be continued to Warm Springs by way of the Center Street line.

✦

Tucson, Ariz.—Preparatory to asking a new franchise from the city, the Tucson Rapid Transit Company has filed for record an amendment to its articles of incorporation extending its corporate life for another 25 years. The company now operates railway lines to the university and through the southern part of the city in addition to bus service started in 1925 under a separate fifteen-year franchise from the city.

✦

Niagara Falls, N. Y.—Justice Ackerman in the Supreme Court at Buffalo has dismissed the application of Niagara Falls taxpayers for an injunction restraining the Public Service Commission from proceeding to fix fares on local lines of the International Railway, Niagara Falls, in connection with the recent contract between the city and the company providing for an 8-cent fare. Justice Ackerman ruled that the judicial district at Buffalo has no jurisdiction in the case. The commission now has the application of the railway for a higher fare here under consideration.

✦

Los Angeles, Cal.—The Pacific Electric Railway has applied to the Railroad Commission for permission to discontinue passenger service on its line between Santa Ana and Orange, stating that service by applicant and Motor Transit Company imposes unnecessary expense, especially as Pacific Electric Railway operations are conducted at a loss.

✦

Binghamton, N. Y.—The Public Service Commission on June 26 authorized the Triple Cities Traction Company to substitute buses for street cars on its Clinton Street lines in Binghamton and Dickinson. Buses to be installed, each carrying 25 passengers, will operate on the same schedule as the street cars. Approximately 3 miles of track will be removed under the substitution plan.

✦

Louisville, Ky.—As a result of sale of all power and substation operations by the Louisville Railway to the Louisville Gas & Electric Company, and entry of a 20-year contract whereby the railway will buy its power, 140 employees of Louisville Railway on July 1 automatically became employees of the Louisville Gas & Electric Company. A farewell dinner to all company power department workers was arranged by the railway on June 28, one group being dined at noon and the other in the evening. James P. Barnes, president of the company; Frank H. Miller, vice-president and general manager; Neil W. Funk, safety director, and Alfred Selligman, attorney, were among the speakers.

✦

Trenton, N. J.—The Public Utility Commission on June 28 ordered suspension for three months from July 15 of a proposed schedule of fares asked by the Public Service Co-ordinated Transport. The company, which is now charging a 10-cent cash fare and selling ten tokens for 50 cents, good on buses or trolleys, seeks to reduce the number of tokens to four for 25 cents. The board announces that time is desired to inquire into the reasonableness of such a rate.

✦

New York, N. Y.—The Transit Commission has postponed until Sept. 4 a hearing on the proposed removal of the Sixth Avenue Elevated line. The delay was granted at the request of Arthur Peacock, of counsel for the Interborough Rapid Transit Company, operator of the line and opponent of the removal.

✦

New York, N. Y.—The Union Motor Coach Terminal, successor to the Waldorf-Astoria terminal and managed by Fifth Avenue Coach Company, has been opened at 59-61 West 36th Street. Motor coach operating companies using the terminal are Gray Line Motor Tours, Inc., Fifth Avenue Coach subsidiary; the Greyhound Lines, the P. R. T. Lines, New England Transportation Company, and Champlain Coach Lines.

✦

Seattle, Wash.—Trackless trolleys will undoubtedly be tried in connection with the Municipal Railway, George B. Avery, utilities superintendent, is conducting an investigation and his final verdict is expected soon. An early proponent of trackless trolleys here was Roy E. Furse, railway superintendent. Councilmen Case and Laube have inspected the trackless trolley system in Salt Lake City and J. W. A. Bollong, city traffic engineer, has studied trackless trolley operation in Eastern cities, particularly the new installation in Detroit.

✦

Philadelphia, Pa.—On June 24 Deputy City Comptroller Wilson, Director Myers, of the Department of City Transit; Councilman Pommer, chairman of City Council's transportation committee, and W. K. Myers, vice-president of Mitten Management, were appointed a committee to consider and report on the method to be followed in arriving at a financial settlement for proposed municipal purchase of the Philadelphia Rapid Transit Company and its underlying systems.

✦

Erie, Pa. — The Erie Railways has asked the Public Service Commission for permission to abandon railway service in West 26th Street and the West Ridge Road. Through its bus operating subsidiary, the Erie Coach Company, the railway plans to operate buses over the route, between Perry Square and the village of Westminster, Pa.

✦

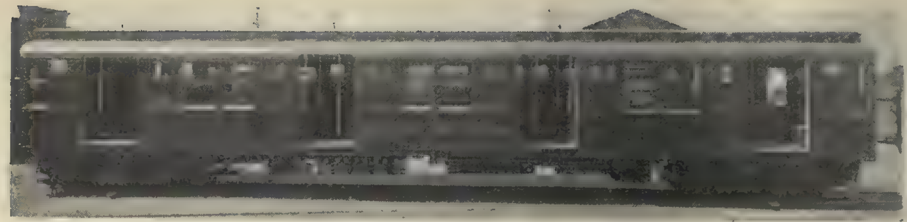
Detroit, Mich.—The Street Railway Commission has authorized Del A. Smith, general manager, to look further into a proposal through which the Frischkorn Realty Company offers to extend trackless trolley overhead construction in Plymouth Road 2 miles west of River Rouge Park, the present terminus. In return for service in the district, the company stands ready to finance the entire cost of the overhead equipment, estimated at $26,000.

✦

Toronto, Ont.—The City Council on June 15 chose the Transportation Commission, responsible for the operation of the local municipal railway and bus lines. It is to be composed of Fred Hubbard, formerly assistant general manager of the Toronto Railway; W. C. McBrien, a member of the Board of Harbor Commissioners; S. J. McMaster, whose name was rejected by Council on several occasions.

✦

Pontiac, Mich.—An ordinance to increase car fare in Pontiac from 7 to 8 cents has been passed by the local City Commission. The bus fare remains unchanged. The new fare schedule also calls for an increase in the price of tickets, from four for 25 cents and 17 for $1, to four for 30 cents and 15 for $1. A charge of 1 cent for transfers from street cars to buses also is allowed. No charge will be made for transfers from buses to street cars. The Eastern Michigan Railways operates here under a day-to-day agreement.



The four-door arrangement of New York's new subway cars is expected to expedite loading

New York Subway Cars Approach Completion

The first consignment of the 300 steel cars for use on the new subway lines of New York City will be delivered during the last week in July. The cars will be equipped with motors and other electrical apparatus at the city's new shops at 207th Street and the Harlem River. This work will cost $2,500,000, bringing the total cost of car construction and equipment up to $11,376,397, or about $38,000 for each of the 300 cars. The cars will be completed and equipped in ample time for thorough testing before they are placed in operation on the new Eighth Avenue line next year.

Four pairs of doors on each side of the car permit rapid ingress and egress in eight files, and it is believed that the time required for loading and unloading passengers can be cut 33⅓ per cent below the minimum on cars now in use here. The new cars will have no vestibules and special door-closing devices are expected not only to expedite loading and unloading but also to cut down the number of injuries to passengers. These devices make it impossible for passengers to hold up progress of a train by pushing the doors back as is now often done on Interborough cars.

Interior arrangement of subway cars provides ample standing capacity

Each of the cars will seat 60 persons and provide standing room for 220, giving a gross capacity of 280 persons for a 60-ft. car. The cars are 10 ft. wide and are expected to have 40 per cent more passenger capacity than the Interborough standard car.

Each car will have 22 electric lamps, each separately wired and not affected by mishap to any of the others. The cars will weigh 42 tons apiece, and each will contain 18,935 rivets, as well as nearly 2 miles of wiring.

◆

Segregation of Akron Properties

In connection with the consolidation of companies in the Commonwealth & Southern group in Ohio, the Northern Ohio Power & Light Company has petitioned the Ohio Public Utilities Commission for permission to segregate its light and power business from its transportation business. This applies to its interurban as well as city lines.

Three companies, the Akron Transportation Company, the Northern Ohio Interurban Company and the Canton Traction Company, have been organized, or are in the process of organization, to take over the transportation business. All tracks, overhead distribution system, cars, buses and other transportation equipment used in furnishing railway and bus service in Akron will be conveyed to Akron Transportation Company subject to the present mortgage liens until paid or retired.

The same plan is to be carried out with reference to the interurban lines of the company and the Canton city system. In each instance Ohio Edison Company will hold the stock.

On July 1 the stockholders approved the consolidation of its power and light properties with those of the Pennsylvania-Ohio Power & Light Company, the Ohio Edison Company, the Akron Steam Heating Company, and the London Light & Power Company.

◆

Unemployment Hurts Toledo Earnings

Operation of the Community Traction Company, Toledo, during the first five months of 1930 resulted in a net deficit of $72,890 as compared with the favorable balance of $95,284 for the similar period last year, after all charges under the Milner ordinance. Service cuts have been held to the minimum so that most of the economies have been from other sources. The drop in revenue from $1,766,995 for the first five months of 1929 to $1,435,751 for the similar period this year has been too much to absorb. Industrial unemployment has been largely responsible for the changed showing. The operating ratio this year is 78.518 per cent as against 71.323 per cent for similar period last year. Bus ratio is 83.048 per cent and railway ratio 76.741 per cent for the current year.

Conspectus of Indexes for June, 1930

Compiled for Publication in Electric Railway Journal by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years	
				High	Low
Street Railway Fares* 1913 = 4.84	June, 1930 **7.97**	May, 1930 **7.96**	June, 1929 **7.76**	June, 1930 **7.97**	June, 1925 **7.27**
Electric Railway Materials* 1913 = 100	June, 1930 **138.9**	May, 1930 **139.9**	June, 1929 **145.8**	Dec., 1926 **159.2**	June, 1930 **138.9**
Electric Railway Wages* 1913 = 100	June, 1930 **231.7**	May, 1930 **231.7**	June, 1929 **230.8**	April, 1930 **231.7**	June, 1925 **222.4**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	June, 1930 **199.5**	May, 1930 **201.1**	June, 1929 **199.7**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	June, 1930 **203.4**	May, 1930 **205.9**	June, 1929 **205.6**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Lab. Stat. 1926 = 100	May, 1930 **89.1**	April, 1930 **90.7**	May, 1929 **95.8**	Nov., 1925 **104.5**	May, 1930 **89.1**
Wholesale Commodities Bradstreet 1913 = 9.21	June, 1930 **10.77**	May, 1930 **10.94**	June, 1929 **12.46**	Dec., 1925 **14.41**	June, 1930 **10.77**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	May, 1930 **150.1**	April, 1930 **151.2**	May, 1929 **153.3**	Nov., 1925 **167.1**	Mar., 1930 **150.1**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	May, 1930 **156.2**	April, 1930 **157.5**	May, 1929 **159.4**	Nov., 1925 **171.8**	May, 1930 **156.2**
Industrial Activity Elec. World, kw.-hr. used 1923-25 = 100	May, 1930 **119.0**	April, 1930 **120.2**	May, 1929 **136.9**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	May, 1930 **92.1**	April, 1930 **93.4**	May, 1929 **102.5**	Oct., 1929 **111.8**	May, 1930 **92.1**
Business Failures	May, 1930	April, 1930	May, 1929	July, 1929	Sept., 1928
Number	2083	1976	1724	1581	1348
Liabilities, Millions of Dollars	**57.72**	**80.71**	**44.58**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

PERSONAL MENTION

C. F. Hirshfeld to Conduct Car Research for Industry

Detroit Edison official Selected as Engineer-Expert for Important Task by Presidents' Conference Committee of A.E.R.A.

APPOINTMENT of C. F. Hirshfeld as chief engineer of the Presidents' Conference Committee, intrusted with the work of expediting the development of the urban railway car, was announced at the meeting of the American Electric Railway Association at San Francisco. It is a most important post, but Mr. Hirshfeld has had a wealth of experience in conducting research projects.

After a thorough canvass of the problem, the committee unanimously decided that a knowledge of car building or the operation of railway properties was not a prerequisite to the position and might constitute a handicap. Rather the man needed, it was decided, was one with wide experience in handling research projects, an engineer-executive, and Mr. Hirshfeld was selected as the man who had demonstrated his ability to conduct large research problems and bring them to a successful conclusion.

As the address of Dr. Thomas Conway, Jr., abstracted elsewhere in this issue, makes plain, Mr. Hirshfeld is relying upon the active co-operation of railway master mechanics, of engineers and technicians of the car builders, of the makers of electric equipment and of braking apparatus and of other groups whose products enter into railway cars. The industry, through the association and especially through the Presidents' Conference, bespeaks full co-operation for Mr. Hirshfeld that worthwhile experiments with any new products may be so carried out as fully to determine their practical usefulness.

Mr. Hirshfeld has been chairman of the technical national section of the National Electric Light Association. He is chief of the research department of the Detroit Edison Company, with which his work has been of a varied character. In addition, Mr. Hirshfeld has conducted a general consulting engineering business. A native of San Francisco, he attended the University of California, from which he was graduated in 1902 with a B.S. in electrical engineering, three years later receiving the M.M.E. degree from Cornell University. From 1903 to 1914 he was a member of the engineering faculty of Cornell, starting as instructor in experimental engineering and ending as full professor of heat-power engineering, machine design, gas-power engineering, etc.

Mr. Hirshfeld has been extremely active in association work, having served as a member of various committees of the American Society of Mechanical Engineers and of the American Institute of Electrical Engineers, as past-chairman of the steam turbine and generator committee of the Association of Edison Illuminating Companies, and as past-chairman of the prime movers committee of the National Electric Light Association. He is the author or co-author of five books on engineering subjects.

C. F. Hirshfeld

Mr. Hirshfeld joined the Detroit Edison Company in 1913 and built up in that company the research department, of which he is chief. His work with the company has been of an extremely varied character, as problems come to the research department from practically all of the other departments of the company. He is particularly well known in the electrical field through his study on industrial electric heating, work started in 1914 and continued with interruptions ever since. He has also been active in rate controversies and in the rehabilitation and management of power plants.

Mr. Hirshfeld served during the World War as major and lieutenant colonel in the Ordnance Department of the United States Army.

◆

Three Commercial Vice-Presidents for Westinghouse

Three new executive positions, the office of commercial vice-president, have been created by the board of directors of the Westinghouse Electric & Manufacturing Company.

C. E. Stephens has been selected to occupy the new position for the Atlantic division, with headquarters at New York City; N. G. Symonds for the central division in Chicago, and W. R. Marshall for the Pacific division at San Francisco.

All of the new commercial vice-presidents have been district managers and will continue the duties of that position, in addition to those of the new position.

W. R. Bell at Baton Rouge, H. C. Leonard in El Paso

W. R. Bell, since 1926 general superintendent of the El Paso Electric Company, El Paso, Tex., has been made general superintendent of the Baton Rouge Electric Company and the Louisiana Steam Products Company, Baton Rouge, La.

Mr. Bell will be succeeded in El Paso by H. C. Leonard, who has been in charge of the electrical department of the Virginia Electric & Power Company, Richmond, Va.

Mr. Bell has been employed by companies operating under the executive management of Stone & Webster, Inc., since 1906. He began in the accounting department of the Paducah Electric Company, working during vacations while attending college. Following his graduation from Rose Polytechnic Institute, Terre Haute, Ind., as electrical engineer, Mr. Bell accepted the position of assistant superintendent of the Baton Rouge Electric Company, later being made sales manager. Still later he was sent to Haverhill, Mass., as sales manager of the Haverhill Gas Light Company. In August, 1924, Mr. Bell was sent to El Paso as sales manager. He made a splendid record as head of the sales department and during his two years as sales manager in El Paso, the volume of appliance sales trebled, the sales floor space was doubled and the sales force was greatly enlarged.

Since becoming general superintendent in 1926, Mr. Bell has been closely identified with some of the most important developments ever undertaken by the company.

Mr. Leonard became associated with the Stone & Webster organization in 1919. He was a member of the group of engineers making an appraisal of the property of the Virginia Electric & Power Company. Upon completion of this work, Mr. Leonard was sent to the Boston office as designer. He remained in Boston only a short time until he was again sent to the Virginia Electric & Power Company, this time entering the engineering department.

Some time after his return to Virginia, Mr. Leonard was made electrical engineer in charge of design of the power station, substations and transmission lines. In 1927 he assumed charge of the electrical department of the company at Norfolk. He remained in Norfolk until early in 1930, when he was promoted and sent to Richmond, in charge of the electrical department of the company there.

Mr. Leonard is a native of Worcester, Mass. He was graduated from Worcester Polytechnic Institute with the degree of B.S. in electrical engineering. Following graduation, he entered the testing and engineering department of the General Electric Company, but he continued his studies at Union College, where he received a degree of M.S.

◆

T. E. Thomas, traffic manager of the London County Council Tramways, London, England, has been appointed general manager to succeed J. K. Bruce, who is retiring on account of ill health. The salary is £2,000 a year, rising after four years by annual increments of £250 to £3,000. Mr. Thomas was formerly commercial superintendent of the Metropolitan District Railway and allied companies. He entered the County Council's service in 1917. He has recently been acting as general manager owing to Mr. Bruce's absence.

M. H. Frank Heads Wisconsin Association

New officers have been elected by the Wisconsin Utilities Association to serve from May 1 as follows:

President—M. H. Frank, assistant to the vice-president, Wisconsin Power & Light Company, Madison.
Vice-president—A. J. Goedjen, division manager, Wisconsin Public Service Corporation, Green Bay.
Treasurer—Ewald Haase, vice-president, Milwaukee Gas Light Company, Milwaukee.
Chairman Employees' Education Section—E. J. Steinberg, The Milwaukee Electric Railway & Light Company, Milwaukee.
Vice-chairman Employees' Education Section—R. G. Walter, Wisconsin Power & Light Company, Madison.

Other section officers are elected at separate conventions held during the year.

Mr. Frank has been manager of the Wisconsin Power & Light Company's Fond du Lac properties since 1918. After obtaining his electrical engineer's degree in 1915 he joined the Indiana & Michigan Electric Company, South Bend, Ind., as assistant construction engineer, where he built the 300-ft. Tainter gate dam and a 4,000-hp. hydro plant.

Mr. Frank remained there until 1916 as assistant engineer having charge of the operation of four hydro electric units, one steam plant and 75 miles of transmission lines. In that year, he became associated with the Galesburg Railway Lighting & Power Company, Galesburg, Ill., as operating engineer, where he laid out a 4,000-hp. steam plant and was in charge of the generation of both electricity and gas. After two years there, Mr. Frank went to Fond du Lac as manager for the former Eastern Wisconsin Electric Company, changed later to the Wisconsin Power & Light Company.

◆

"Bob" Harper Promoted by Virginia Electric Power

H. Holmes Harper has recently been transferred from the printing and stationery bureau of the Virginia Electric & Power Company at Richmond to the vice-president's office in Norfolk, where he is now assistant to Vice-President R. J. Throckmorton and associate editor of *The Vepcovian*. He replaces A. E. Dunn, who has been transferred to the distribution department at Norfolk.

"Bob" Harper was born near Burkeville, Va., on Nov. 4, 1906. He was graduated from Virginia Polytechnic Institute in June, 1927, with a degree of B.S. in electrical engineering. Mr. Harper joined the Vepco organization as a student engineer and was assigned to the production department at Richmond. He was later transferred to the treasurer's office where he viewed the various operations of the company from a statistical standpoint, and in June, 1929, he became assistant supervisor in the printing and stationery bureau.

◆

M. M. Lloyd Retires from South Shore

M. M. Lloyd, for more than eleven years superintendent of shops and equipment for the Chicago, South Shore & South Bend Railroad, South Bend, Ind., and its predecessor companies, has retired from active service. His duties have been taken over temporarily by W. J. Freeman.

Mr. Lloyd was born in Rockford, Mich., on April 7, 1868. He went to the South Bend property in 1919 from Saginaw, Mich., where he had been master mechanic of the northwest division of the Michigan Railways. Previously he had worked as master mechanic for the Des Moines City Railway and the Interurban Railway, Des Moines, and the East St. Louis and Alton & Granite City lines in southern Illinois.

His first work was as locomotive engineer and motorman in Wichita, Kan., and then in St. Louis and in Granite City, Ill., as division foreman for the Sprague Electric Company and electrician with the American Steel Foundries.

◆

T. M. van der Stempel Joins General Car & Coach Company

Th. M. van der Stempel, who has been with the McGraw-Hill Publishing Company, Inc., since Jan. 1, 1929, and since April 1 of that year a member of the editorial staff of Electric Railway Journal, has recently resigned to accept a position with the newly organized General Car & Coach Corporation in Utica, N. Y., in charge of sales.

T. M. van der Stempel

Mr. van der Stempel has spent nearly all his time since his graduation as a mechanical and electrical engineer in 1920 in the transportation engineering field in various capacities. From August, 1924, to June, 1927, he was connected with the Chicago Motor Coach Company. There he learned the intricacies of city bus service from the ground up, starting as conductor and driver and advancing to the position of engineer in the traffic department, a post he relinguished to survey transportation facilities abroad, notably in Central America, South America and in Europe. Thus during 1927 and 1928 he studied the transportation facilities in 23 different countries.

During his work as a member of the editorial staff of Electric Railway Journal in charge of the new equipment, maintenance and foreign departments, he traveled widely throughout this country and increased his acquaintanceship among operators in both the electric railway and bus fields. His actual operating experience, his extensive study of railway and bus operating practices here and abroad and his work as a journalist all serve to qualify him to fill acceptably his new post in promotional work.

J. K. Bruce Resigns as London Tramway Manager

J. K. Bruce, the general manager of the London County Council's tramways, has tendered his resignation on the ground of ill health. The Council expressed deep regret. Since he became manager in 1924, the tramway undertaking instead of working at a loss as before is now making substantial profits. The change is attributed largely to the policy of Mr. Bruce in meeting competition by providing luxurious seats for tramcar passengers, raising the speed of the cars, improving the lighting, and generally making the service more attractive to the public. Mr. Bruce on retirement on June 30 became entitled to a pension of £805 and a lump sum of £2,426. In view of his great services a special grant of £2,000 is also proposed.

Mr. Bruce entered the service of the Council as a veterinary surgeon in the old horse car days of 1898. He served in turn as deputy chief officer and acting manager before he reached his present position in 1924. Statistics issued by the County Council show how under Mr. Bruce's management deficits on the working of the undertaking were changed into surpluses. Preliminary figures for the financial year ended March 31 show that after paying all expenses and debt charges (sinking fund and interest) there is a net surplus of £52,570. For the financial year now opening the estimate is that there will be a net surplus of £89,000. To recall the magnitude of the London municipal tramway undertaking, it may be mentioned that for the past financial year the receipts amounted to £4,413,450, and the working expenses including renewals to £3,638,505.

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Oren Root Resigns from Hudson & Manhattan

Oren Root, for almost eleven years president of the Hudson & Manhattan Railroad, operating under the Hudson River from New York to Newark and to Hoboken, has resigned, effective Sept. 1. The directors have not yet elected a successor.

Mr. Root resigned for personal reasons only. He is only 56 years old, and after a period of rest may re-enter business, but has no definite plans at present.

When Mr. Root took his post, the Hudson & Manhattan first lien and refunding mortgage 5s, Series A, were quoted at 57, and the adjusted mortgage income 5s were 16, while the preferred and common stocks were seldom traded in. An initial semi-annual preferred dividend of 2½ per cent was paid Aug. 15, 1923, and has been maintained to date, while an initial semi-annual common dividend was paid June 1, 1925, at the annual rate of 2½ per cent. The rate was advanced recently to $3.50 annually. The first lien 5s now sell at 99½, the adjusted mortgage 5s at 83⅜, the preferred stock at 81 and the common at 48⅜.

Mr. Root entered electric railway work in 1895 with the Metropolitan Street Railway of New York. He was schooled later in all departments of the company, working as a motorman, conductor, inspector and in other capacities. In 1903, he was appointed general manager of the Metropolitan and on Sept. 20, 1919, was elected president of the Hudson & Manhattan Railroad. He is a nephew of Elihu Root.

Many Changes on New Haven Bus and Suburban Lines

P. W. J. Smith has been made president of the New England Transportation Company, motor coach subsidiary of the New Haven, succeeding A. P. Russell, executive vice-president of the railroad. Mr. Smith, has been general superintendent of the New York, Westchester & Boston Railway and in charge of the motor coach lines of the County Transportation Company for several years. He retired from the New York, Westchester & Boston July 1. He has been connected with the New Haven or its allied lines for 42 years. He will establish headquarters for the New England Transportation Company in Providence, R. I. and will also become president of the County Transportation Company and the Sound View Transportation Company, subsidiaries of the New York, Westchester & Boston.

Leverett S. Miller has been president of the New York, Westchester & Boston Railway since May, 1909, and president of the County Transportation Company since April, 1927. He retired at his own request on July 1, after long and faithful service. For many years, prior to his connection with the New York, Westchester & Boston, he was general manager of the Central New England Railway. The office of president of the New York, Westchester & Boston will be assumed by J. J. Pelley, president of the New Haven.

W. H. Foster, general superintendent, and A. G. Baily, superintendent of the New York division of the New Haven, will act in those capacities with the New York, Westchester & Boston, which are now operated as an integral part of the New Haven rail system.

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K. F. Sapp in New Post in Atlanta

Kenneth Finch Sapp, recently appointed assistant to the manager, public relations department, Georgia Power Company, Atlanta, Ga., was born at Ottawa, Ill., on Oct. 11, 1901. He prepared in the elementary and high schools of Ottawa and attended the University of Illinois. Since leaving college, he served as sporting editor of the *Daily Republican-Times*, Ottawa, Ill., and as reporter on the *News-Herald*, Joliet, Ill., and the *Atlanta Constitution*, Atlanta, Ga. He resigned from the *Constitution* in 1925 to become a member of the staff of the public relations department, Georgia Power Company, being appointed editor of publications in November, 1926, and assistant to the manager in May, 1930.

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E. C. Rust Eastern Massachusetts Director and Trustee

At a recent meeting of directors of the Eastern Massachusetts Street Railway, Charles W. Hubbard, Jr., resigned and Edgar C. Rust was elected a director in his place. Mr. Rust was also elected a trustee of the road, under the provision of the public control act which permits the road's directors to elect one of the three trustees from among themselves. He fills the vacancy created by the resignation of Lester Watson.

Although he has resigned as a trustee, Mr. Watson will continue to serve as a member and chairman of the board of directors. He is retiring from the board of trustees simply because the duties of membership leave him insufficient time to devote to other necessary affairs. Mr. Watson's firm, Hayden, Stone & Company, still retains the very substantial interest in the road.

Edgar C. Rust, the new trustee and director, is well known in the financial community due to his years of association with E. H. Rollins, from the presidency of which concern he retired last year.

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R. M. Heinrichs, Bendix-Westinghouse Manager

R. M. Heinrichs

R. M. Heinrichs has been appointed general manager of the newly formed Bendix-Westinghouse Automotive Air Brake Company. Mr. Heinrichs comes to the new brake company with a broad experience in the automotive field, having formerly served the Bendix Corporation as assistant to the vice-president in charge of sales. His connection with the Bendix Corporation covers a period of five years, previous to which time he had been identified with the Goodman Manufacturing Company, Chicago. He is a graduate of the engineering school at the University of Illinois.

As general manager of the new company, Mr. Heinrichs will have at his disposal the engineering and service departments of both Bendix and Westinghouse effectively to serve the automotive industry. Manufacture of the automotive air brake will continue in the plants of the Westinghouse Air Brake Company at Wilmerding.

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Irving M. Tuteur, vice-president of McJunkin Advertising Company, Chicago, was elected president of the Public Utilities Advertising Association for the year 1930-31 at the association's annual convention held recently in conjunction with the annual meeting of the Advertising Federation of America. The new president has served the association for five years as chairman and one year as vice-chairman of its "Better Copy" committee, which has been devoted to the improvement of public utility advertising throughout the country. Under the direction of this committee, four "Better Copy" portfolios of outstanding public utility advertising have been published in the last six years. The committee has also conducted two nationwide "Better Copy" contests among utility companies.

F. L. Butler Heads Commonwealth Transportation Department

Further recognition of his outstanding ability among electric railway operators of the nation was accorded Frank L. Butler, vice-president in charge of railways for the Georgia Power Company, Atlanta, Ga., in his appointment, announced recently, as head of the transportation department of the Commonwealth & Southern Corporation, supervising company for the Georgia Power Company and its associated companies.

In his new position, Mr. Butler will be on call to give advice and assistance to all companies in the Commonwealth & Southern organization on transportation problems, but will remain in Atlanta as active head of the Georgia Power Company's railways. For many years Mr. Butler has been recognized as one of the leading electric railway authorities in America and has been high in the councils of the American Electric Railway Association. He has headed many important committees for that association and has had a leading rôle in shaping its policies. He is at present a member of its executive committee.

✦

J. M. Pogue Elected Vice-President of Interurban

J. M. Pogue, who has been director of purchases and claims of the Cincinnati & Lake Erie Railway at Springfield, Ohio, since its organization early this year, has been elected a vice-president of the concern.

Mr. Pogue will continue to make his headquarters in the interurban building in Springfield, where he has been located for a number of years. He entered the employ of the railway system in 1907, and has served in various capacities under several managements. He acted as general manager for the receiver of the old Indiana, Columbus & Eastern system prior to its absorption by the present company.

The Cincinnati & Lake Erie Railway now is operated under the general supervision of five vice-presidents, one located in Cincinnati, one in Philadelphia, two in Dayton, and Mr. Pogue in Springfield. Its lines extend from Cincinnati to Lake Erie cities and as far east as Columbus.

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W. S. Howland Now Edits "Snap Shots"

William S. Howland, editor of *Snap Shots*, Georgia Power Company, Atlanta, was born in New York, on June 18, 1901. He was educated at Phillips Exeter Academy, Exeter, N. H., and Princeton University, being graduated in 1923 from Princeton with a degree of A.B. Since leaving college, he has served as reporter on the *Atlanta Journal* and as a reporter and city editor of the *Tennessean*, Nashville, Tenn. He resigned as city editor of the *Tennessean* in April, 1929, to join the staff of the public relations department, Georgia Power Company, being appointed editor of *Snap Shots* in January of this year. In addition to serving as city editor of the *Tennessean*, he was editor of the *American*, a house organ published by the American Banks, Nashville, Tenn., and was instructor in journalism at George Peabody College for Teachers, Nashville, Tenn., for the summer session of 1928.

H. S. Newton Retires from Utility Work

Henry S. Newton, manager of the Parkersburg-Marietta division of the Monongahela-West Penn Public Service Company for seven years and for the past five years manager of the industrial development department of the West Penn, has retired from utility work. He will take up permanent residence on the eastern shore of Chesapeake Bay, near Easton, Md.

Mr. Newton has been engaged in utility work for more than a quarter of a century. He was graduated from the Ohio State College in electrical engineering with the degree of bachelor of science. His first work was with the General Electric Company, for which he served last as superintendent of one of its plants. After leaving that company he worked in a managerial capacity for various utilities, including the Hartford & Springfield Railway, connecting Hartford, Conn., and Springfield, Mass.; the Syracuse Rapid Transit Company; the Ohio Valley Electric Railway at Huntington, and several railways in Minnesota.

He went with the Monongahela system as manager of its electric railway and power properties at Parkersburg and Marietta and remained in that position for seven years before going to Fairmont, W. Va., as manager of the industrial development department.

OBITUARY

Richard Meriwether

Richard Meriwether, vice-president and general manager of the Dallas Railway & Terminal Company and the Texas Interurban Railway, Dallas, Tex., died on May 26 on a Missouri-Kansas-Texas train at St. Louis, Mo. Mr. Meriwether had left Dallas for New York on a short business trip. When the train pulled into the St. Louis Union Station a porter attempted to wake Mr. Meriwether, but failing to get any response summoned aid. The doctor who responded said Mr. Meriwether had died from natural causes.

Richard Meriwether

Mr. Meriwether directed one of the few systems of its kind in the country that had maintained steady earnings and a sound financial basis in the face of decreases in the business over the country. He began his management of the company in 1917 and has served continuously.

Born at Frankfort, Ky., Oct. 13, 1875, Mr. Meriwether attended grade and high schools at Louisville, Ky. He entered the Rose Polytechnic Institute, Terre Haute, Ind., where he was graduated with electrical engineering as major subject.

His career began with the Southern Railroad. He then became connected with Siemens-Halske Electric Company of Chicago and the Western Electric Company of Chicago. In 1903 he went with the Louisville Railway as assistant to the superintendent of power, in charge of transmission lines.

Three years later he became associated with the Louisville & Eastern Railroad, an interurban line running from Louisville to Beard Station, Ky. He began as mechanical superintendent and was made general superintendent in charge of operation and construction in 1908.

He accepted a position with Stone & Webster in 1911 and went to Dallas as general superintendent of the Dallas Consolidated Electric Street Railway, the Rapid Transit Railway and the Metropolitan Street Railway. These companies were consolidated in 1917 and Mr. Meriwether became general manager. He was made vice-president and general manager in the spring of 1918.

As managing head of the Texas Interurban Railway, Mr. Meriwether was responsible for the building and operation of interurban lines to Terrell and Denton.

Mr. Meriwether also was active in civic and social affairs of Dallas. He was a director of the Republic National Bank & Trust Company, the Continental & Loan Association and the Better Homes Bureau. He was past-president of the Dallas Rotary Club and the Dallas Athletic Club. He also was a member of the City Club and Brook Hollow Golf Club.

More than 200 employees of the company and other electric railway lines gathered with other friends at the funeral and drove in a mile-long procession to Grove Hill Cemetery, where the remains were interred with Masonic rites.

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G. R. Millican

George Raymond Millican, 43 years old, vice-president and general manager of the Evansville & Ohio Valley Railway, died recently at his home in Evansville, Ind.

Besides being vice-president and general manager of the railway, Mr. Millican was president of the board of deacons of the First Presbyterian Church, a member of the Rotary club, a member of the Evansville Country Club, and a member of the Purdue University chapter of the Phi Delta Theta fraternity.

Starting out with the Evansville & Ohio Valley Railway on a surveying gang during vacations from school he remained with that company until death, becoming its vice-president and general manager when barely past 30 years of ago.

He attended Purdue University and in 1907 entered the employ of the railway. In 1910 he was transferred to Owensboro, Ky., as general manager of the Owensboro City Railroad, a subsidiary.

Mr. Millican was born in Evansville on Sept. 19, 1886.

S. R. Artman

Samuel R. Artman, long active in Indiana public affairs and best known for his rulings as a member of the Indiana Public Service Commission, died recently of injuries sustained in a fall from the roof of his home in Lebanon, Ind. Mr. Artman was graduated from the Indiana state normal school at Terre Haute. He taught school for four years and then read law in Lebanon. He was elected to the Legislature and later judge of the Circuit Court at Lebanon. In 1923 he was appointed a member of the Indiana Public Service Commission, remaining in that position six years, when he then was named special assistant attorney general.

✦

H. A. Davis

Hiram A. Davis, who went to Nashville, Tenn., from New Orleans in 1902, to become superintendent of the railway department of the Nashville Railway & Light Company, died on May 30. He served in the one capacity for twenty-eight years.

Mr. Davis was one of the city's active civic workers, and one of the city's most aggressive sponsors of the safety movement. He applied his safety principles to his own street cars, and as a result the company established a record for safety which national authorities declared was unsurpassed. He was an active member of the Nashville Automobile Club, and the founder of the Nashville Safety Council. That his civic work was appreciated is attested by the public recognition it received.

H. A. Davis

Mr. Davis was born in Oswego, N. Y., on April 3, 1866. He was educated in the New York schools, and entered the electric railway industry as chief engineer at the power station of the Steinway Railway, Long Island City. Shortly afterward Mr. Davis went to New Orleans as superintendent of equipment of the New Orleans & Carrollton Railway, now included in the system of the New Orleans Public Service.

For fifteen years Mr. Davis was a member of the Rotary Club; he was a Scottish Rite Mason and a Shriner; he was an active church worker, being a member of the Board of Deacons of Edgefield Baptist church; he was a member of the board of directors of the Tennessee Children's Home; a member of the board of directors of the Tennessee Hermitage National Bank.

He is survived by his brother, George H. Davis, of the firm of Ford, Bacon & Davis, New York; his wife, Mrs. Isa Outwater Davis, a daughter and a son.

Col. Timothy S. Williams

Col. Timothy S. Williams, former president of the Brooklyn Rapid Transit System, now the Brooklyn-Manhattan Transit Corporation, which he served in various capacities for more than twenty years, collapsed and died suddenly in New York City on June 3 while on a visit to the city made from his estate at Huntington, Long Island.

Colonel Williams succeeded to the presidency in Brooklyn following the retirement of Edwin W. Winter. Mr. Winter had worked like a demon to snatch the system from pending receivership when he took hold and when the work of rehabilitation, which he carried out most expeditiously, was completed he turned the system over to Colonel Williams. Soon after Colonel Williams took charge the new subway contracts were negotiated, but then came the trying experiences due to the World War and in its wake a succession of economic events that the Brooklyn Rapid Transit, as a corporate entity, did not survive. During that period the system, like so many other electric railways, was almost constantly in hot water, politically, economically and financially. Colonel Williams worked prodigiously against the current of events which had set in against the company, but finally came receivership under Lindley M. Garrison and eventually reorganization with W. S. Menden, who had worked side by side with Colonel Williams, as president in complete charge of operation.

Timothy Shaler Williams was born at Ithaca, N. Y., on Aug. 1, 1862. Following his graduation from Cornell University with the class of 1884, he came to New York and joined the staff of the old *Commercial Advertiser,* as a reporter. Later, he served that paper as Albany correspondent, Washington correspondent, city editor and editorial writer. He left newspaper work to become private secretary to Governor David B. Hill, a position he also held with Governor Roswell P. Flower. Upon the retirement of Governor Flower from office, Mr. Williams undertook to reorganize the Long Island Traction Company, out of which grew the Brooklyn Rapid Transit System of companies. In 1895 he became secretary of the reorganization committee. A few months later he was named secretary and treasurer of the Brooklyn Heights Railroad. From 1901 to 1911 he was vice-president of the Brooklyn Rapid Transit System.

◆

R. H. Selbie

R. H. Selbie, general manager of the Metropolitan Railway, London, England, died recently while attending a confirmation service at St. Paul's Cathedral conducted by Bishop Perrin, at which his younger son, Andrew, was one of the candidates. Mr. Selbie was 62 years of age. He had returned on May 6 from a sea voyage of three weeks, taken for the benefit of his health. Mr. Selbie was educated at Manchester Grammar School and Victoria (now Manchester) University. He joined the staff of the Lancashire & Yorkshire Railway before being appointed in 1908 general manager of the Metropolitan Railway. He was also a director of several land and development companies. He served as chairman of the Board of Trade Committee on the utilization and feeding of horses, and was controller of horse transport at the Board of Trade and a member of the Army Forage Committee during the war. For his services he was created C.B.E. Last December he was elected chairman of the General Managers' Conference.

◆

William Gordon Gordon

William Gordon Gordon, manager of the railway and traction engineering department of the Canadian General Electric Company, died in Toronto, May 13, from pneumonia, after a short illness. He was born at Ottawa, July 22, 1877. Mr. Gordon was educated at Winnipeg, Halifax and Cornell University, taking the degree of mechanical engineer and electrical engineer at the latter in 1899. He then entered the General Electric Company's service at Schenectady, N. Y., first in the testing department. While in its railway construction department he had charge of the installation of the first electrically operated train on Manhattan elevated railway, New York. Later he assisted in installing the first multiple-unit equipment for Northwestern Elevated Railway. Subsequently, while in the railway engineering department at Schenectady, he was associated closely with the further development of multiple-unit operation for the New York Central Lines and the Interborough Rapid Transit Company. In 1905 he went to Australia in the General Electric Company's railway interests, and was manager and engineer of North Melbourne Tramways & Lighting Company. He returned to Canada in 1913 and entered the Canadian General Electric Company's service. In 1919 he was appointed manager of the Canadian General Electric Company's railway and traction engineering department.

◆

M. T. Donnelly

Morgan T. Donnelly, assistant counsel to the New York State Transit Commission and former Deputy Public Service Commissioner, died on June 30. He was 47 years old. Mr. Donnelly was appointed to his position with the transit commission on Feb. 6 and soon afterward left on sick leave. He was appointed Third Deputy Public Service Commissioner on Dec. 30, 1919, by former Governor Smith and served two years under Chairmen Lewis Nixon and Alfred M. Barrett.

◆

J. T. Branigan

John T. Branigan, general night superintendent of the Department of Street Railways at Detroit, Mich., died on June 5. Born in County Armagh, Ireland, Mr. Branigan went to Canada with his parents at the age of nine. Thirty-seven years ago he went to Detroit, and in 1899 he became a motorman on the Trumbull Avenue lines of Detroit United Railway, now included in the municipal transportation system. Later he was employed in a similar capacity on the Baker line, and in 1924 he was made assistant superintendent, in which position he remained until 1928, when he was made general night superintendent.

◆

Coker F. Clarkson, lawyer and student of electrical and automobile engineering, who had been secretary and general manager of the Society of Automotive Engineers for twenty years, died on June 4 of heart disease at his home, Sleepy Hollow Farm, Scarborough-on-Hudson. He was 60 years old.

Elmer A. Sperry

Elmer A. Sperry, famous inventor, engineer and manufacturer, died on June 16. He was in his seventieth year. He was a charter member of the American Institute of Electrical Engineers and the American Electrochemical Society and one whose inventions and activities, if not all strictly in the electrical field, all tied in closely with electrophysics. At the time of his death he was chairman of the board of the Sperry Gyroscope Company, Brooklyn.

Elmer Ambrose Sperry was born in Cortland, N. Y., on Oct. 12, 1860. He was educated at the State Normal School, and attended Cornell University, Ithaca, for a short period. A natural-born machinist and inventor, he designed in 1879, while yet a youth, a device for the perfection of one of the first electric arc lamps. This device was generally adopted. In the following year he founded the Sperry Electric Company, Chicago, to manufacture arc lamps, dynamos, motors and other electrical apparatus. This was the first of a long series of enterprises employing electricity promoted by him. They covered such diverse apparatus or fields as beacon lights of many descriptions, mining machinery, electric railway cars, automobiles, airplanes, commercial chemistry, detinning processes and the production of fuse wires.

◆

Edwin W. Winter

Edwin W. Winter, former president of the Northern Pacific Railroad and the Brooklyn Rapid Transit Company, died on June 28 after a brief illness, while on a visit in Fall River, Mass.

Mr. Winter left the post of president of the Chicago Transfer & Clearing Company to take over the presidency and direct the rehabilitation of the Brooklyn Rapid Transit Company in 1903 when relations between the company and the public were strained. It was understood that he was to remain only a short time, but his management was so successful that his service with the company was extended from year to year, and he did not resign until January, 1911. A diminutive man but impressive in appearance, Edwin Winter threw himself into the task in Brooklyn with great zeal, building up quickly one of the most impressive organizations, so far as personnel was concerned, probably ever assembled for a work of the kind, his most able lieutenants including J. F. Calderwood, W. S. Menden, W. G. Gove, A. S. Dutton, Dow Smith, W. O. Wood and others. His work in revamping the system attracted wide attention and received public acclaim.

Mr. Winter had been a railroad man all his life. He was born in Vermont in 1845 and when a youth, entered the service of the Union Pacific Railroad in its construction department. Later he was a contractor's agent in the construction of various railroads and then for three years was claim agent of the Chicago & Northwestern Railroad. He subsequently served with the West Wisconsin Railway as general superintendent and held a similar post with the St. Paul, Minneapolis & Omaha Road, of which he became assistant to the president. In 1897, he was made president of the Northern Pacific, relinquishing that position two years later to become president of the Chicago Transfer & Clearing Company.

INDUSTRY MARKET AND TRADE NEWS

The new cars of the Cincinnati & Lake Erie Railroad are designed to make a maximum speed of 75 m.p.h.

Cincinnati & Lake Erie Railroad Receives New Cars

Delivery is now under way of the twenty passenger cars ordered last year from the Cincinnati Car Corporation for service on the reorganized Cincinnati & Lake Erie Railroad. Earlier announcements to the effect that these cars would embody many features unusual in design have served to arouse the interest of the industry and their delivery has attracted considerable attention.

Ten of the cars, which are intended for de luxe limited service, contain a lounge compartment at the rear, equipped with comfortable movable furniture, including chairs, sofas, tables and lamps. The compartment is carpeted and is provided with wide-vision windows of plate glass. Incidental equipment includes electric fans, water-operated toilet and lavatory, iced drinking water and other features. The de luxe limited cars have been equipped with Westinghouse motor and control equipment and will weigh complete about 47,700 lb. The other ten cars, which are designed for local service, are provided with General Electric motors, control and brakes. The de luxe cars will seat 38 passengers and the locals 46. Both types are designed for one-man two-men, single-end operation. During initial trials the cars are said to have attained a maximum speed of over 75 m.p.h.

Bodies are of steel construction with extensive use of aluminum. Length over all is given at 43 ft. 9 in., with length over the body posts of 33 ft. 10 in. Width over all is 8 ft. 9⅝ in., with height, rail to trolley base, of 11 ft. 4 in. Truck wheelbase is 6 ft. 2 in., with bolster centers spaced at 23 ft. 2 in. Roof is of the arch type. Other specifications are as shown elsewhere in this issue.

◆

Northwestern Pacific Railroad Orders New Rolling Stock

Seven motor cars and two trailers for passenger service have been ordered by the Northwestern Pacific Railroad, San Francisco, Cal., from the St. Louis Car Company, delivery to be made in September. The railway, a third rail system, is associated with the Southern Pacific lines, and operates from Sausalito, in the Marin peninsula, serving Corte Madera, Fairfax, San Rafael and communities in the Mill Valley region.

The new coaches have an over-all length of 72 ft. 10½ in., and a width over the eaves of 10 ft. 6 in. The motor cars, which are equipped with Westinghouse No. 557 E motors and mounted on trucks supplied by the General Steel Castings Corp., weigh complete 110,000 lb., while the weight of the trail cars is given as 79,200 lb. Body construction is of aluminum and steel, with arch roofs. Seating capacity of the motor cars is 98 passengers and of the trail cars 103 passengers. Additional equipment details are supplied in an accompanying table.

◆

Single-Truck Cars for Louisiana Property

The J. G. Brill Company, Philadelphia, Pa., has recently delivered four single-truck, double-end, one-man motor cars to the municipal street railway of Monroe, La. The cars were built at the plant of the American Car Company, at St. Louis.

Body construction is all steel, with arch roof. Over-all length is 28 ft., over-all width 8 ft., and height, rail to trolley base, is 9 ft. 10⅝ in. Weight is 16,000 lb.

◆

Long Island Railroad Has 85 Steel Passenger Cars on Order

To augment its passenger-carrying equipment this year, the Long Island Railroad recently placed orders for the immediate construction of 45 multiple-unit steel cars at a cost of $1,395,000. Delivery of these cars will begin in August and be completed in September.

The type of car just ordered has a seating capacity of 69 persons and the length over all is 70½ feet. The Pressed Steel Car Company of McKees Rocks, Pa., is building 25 of them, and the American Car & Foundry Company of Berwick, Pa., is constructing the remaining twenty cars.

A special safety feature of the new cars will be a door-interlocking device, or signal light, indicating to the motorman that the doors are closed. Each car will be equipped with train control apparatus. Roller bearing trucks will make riding easier, and better distribu-

Wide aisles, improved lighting effects and leather-upholstered seats add to comfort of travel on new C. & L. E. cars

Individual chairs of rich upholstery, a carpeted floor and wide-vision windows are provided in the observation compartment tion of lighting will be effected through the installation of additional pedestal lamps in each car and increased wattage of the lamps.

With the 40 multiple-unit cars which were delivered before June 1, the Long Island Railroad will have increased its passenger-carrying equipment in 1930 by 85 cars.

◆

New Des Moines Cars Embody Distinctive Features

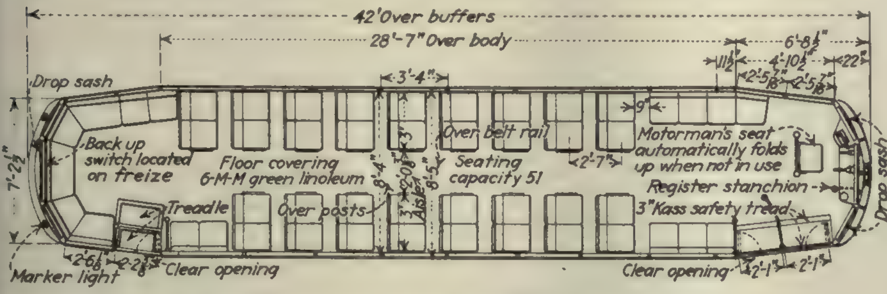
Cummings Car & Coach Company, of Chicago, has delivered 40 single-end, all steel, one-man motor cars to the Des Moines Railway for service on its city lines. In appearance the new cars follow a well-balanced design, which is attained by providing wide-vision windows, a narrow letter board and a low arched roof. Exterior painting scheme is carried out in cream above the belt rail and red below, with monogram, numbers and striping in aluminum. The interiors are finished in enamel, with cream headlining. Frieze panel, post capping, sash, window capping and wainscoting are finished in three colors shading from light tan for the frieze panel to dark brown for the wainscoting, the latter matching the brown leather seats.

Wide aisles, upholstered seats and ample lighting effects lend a pleasing appearance to new Des Moines cars

There are no bulkheads in the car and the headlining is continuous throughout its entire length. Illumination is provided by a large number of dome light fixtures over the center line of the seats on either side. Seats are of semi-bucket type.

Electrical equipment consists of four General Electric No. 247 motors of 40 hp. with tapped fields and K-75 control with safety features. The cars are designed for single-end operation, but are provided with back-up equipment. All doors are pneumatically operated, equipment being provided by National Pneumatic Company. Step wells are provided at front and rear. Entrance and exit doors on front vestibules are selectively controlled, with treadle control at the rear exit. Trucks are Cummings Car & Coach Company's No. 64 equalizer type with 3¾x7-in. journals.

The weight of the cars, completely equipped, is given as 35,300 lb. It is expected to attain an acceleration of 3 m.p.h.p.s., and a free running speed of 37 m.p.h. Additional details are shown elsewhere in this issue.



Des Moines cars provide seats for 51 passengers

◆

The Okonite Company announces the appointment of Elbridge H. McNeill as manager of the power and light department of the company's Chicago branch. Mr. McNeill has had charge of certain railroad, industrial and public utility accounts for the company since 1925. Charles E. Brown, formerly manager of the power and light department of the Okonite Company, has been appointed assistant general manager of the company with headquarters in New York.

Detail Specifications Accompanying Recent Car Orders

Name of railway	Des Moines Railway	City of Monroe, La	Cincinnati & Lake Erie	Windsor, Ex. & Lake Shore	Northwestern Pacific R.R.
City and state	Des Moines, Iowa	Monroe, La	Dayton, Ohio	Windsor, Ont., Canada	San Francisco, Cal.
Number of units	40	4	20	3 motor, 1 trail	7 motor, 2 trail
Builder of car body	Cummings Car & Coach	American Car Company	Cincinnati Car Corp	Ottawa Car Mfg. Co	St. Louis Car Company
Air brakes	General Electric	General Electric	10 Westinghouse 10 General Electric	Westinghouse	Westinghouse
Armature bearings	Plain	Roller	Plain	Plain	Plain
Axles	3¾-in. x 7-in.	Brill "Friction"	A.E.R.E.A. Standard E-6.	A.E.R.E.A. No. E-8	U. S. Steel Products Co.
Car signal system	Cons. Car Heating Co	Faraday	Keystone	Faraday	Westinghouse
Compressors	Chicago Pneumatic 27-B	General Electric CP-25	D.H. 16	Westinghouse D.H. 25	Westinghouse
Conduit	Duratube	Flexible loom	Flexible	Flexible and rigid	Aluminum
Control	General Electric K-75	General Electric K-63-G	10 G.E. PC, 10 Wes. HLF.	Westinghouse HL	Westinghouse
Couplers			Draw bar type	Tomlinson form 10	Westinghouse automatic
Curtain fixtures		National Lock Washer Co.	Curtain Supply Co	National Lock Washer Co.	O. M. Edwards
Curtain material		Pantasote No. 86	Pantasote	Pantasote	Pantasote
Destination signs	Keystone type 8	Hunter	Hunter	Hunter	
Door mechanism	National Pneumatic	National Pneumatic	National Pneumatic	National Pneumatic	National Pneumatic
Doors	Folding	Folding	Swinging	Folding	Sliding
Fare boxes		Johnson		None	Ohmer
Finish	Enamel	Paint	Duco lacquer	Lacquer	Pyroxylin lacquer
Floor covering	Linoleum	None	Linoleum	None	Flexolith
Gears and pinions	General Electric		Helical—forged steel	Nuttal helical	Westinghouse
Glass	Plate	Plate	Non-shatterable at front and rear vestibules and front bulkhead	Plate	Plate
Hand brakes	Pittsburgh No. 35	American Car Company	Peacock staffless	Peacock	W. H. Miner
Heat insulating material			Compressed cork	Cork	
Heaters	Railway Utility Co	Railway Utility Co	Cons. Car Heating Co	Canadian General Electric	Railway Utility Co
Headlights	Golden Glow type SM-95.	Golden Glow type SM-95.	Ohio Brass	Ohio Brass	General Electric J-28
Headlining	¼-in. Agasote		Agasote	Agasote	
Interior trim	Enamel—light tan to br'n	Birch	Wal. fin. alum. and cherry.	Birch	Aluminum
Journal bearings	Plain	Plain	More-Jones Hi-speed	Plain	Plain, Magnus Co.
Journal boxes	Cummings Car & Coach	Brill "Friction"	Pedestal type 4½x8 in	Cast steel	Symington
Lamp fixtures	El. Serv. Sup. dome type	General Electric	Model T		
Motors	General Electric No. 247	General Electric 264-A	10 G. E., 10 Westingh'se	Westinghouse No. 548	Westinghouse 557-E
Painting scheme (color used)	Exterior—cream and red	Chrome yellow	Tuscan red	Blue and yellow	Tangerine
Registers	Ohmer No. 3		National Cash Reg. Co	None	
Roof type	Arch	Arch	Arch	Arch	Arch
Roof material	Wood—canvas covered	Wood—canvas covered	Wood—canvas covered	Wood—canvas covered	Aluminum
Safety car devices	General Electric	General Electric	Safety Car Devices Co	Westinghouse	
Sash fixtures	Dayton	Adams & Westlake			
Seats		Amer. Car Co. "Waylo"	Hale & Kilburn No. 900D	Heywood-Wakefield	Hale & Kilburn No. 392A
Seat spacing	31 in	28½ in	33 in	32½ in	32 in.
Seating material	Leather	Wood and rattan	Leather	Plush and leather	Leather
Slack adjusters	Cummings Car & Coach	Brill	Anderson	Westinghouse	Westinghouse type J
Steps	Stationary	Folding	Stationary	Folding	Stationary
Step treads	Kass	Kass	Safkar		Kass
Trolley catchers	Ohio Brass	Keystone	Ohio Brass	Ohio Brass retrievers	Third rail used
Trolley base	General Electric	U. S.-20 Form A	Ohio Brass		
Trucks	Cum. Car & Coach No. 64.	Brill 79-E-1	Cin. Car Corp. ABC-740.	National Steel Car Co	General Steel Cast's Co.
Ventilators	Railway Utility Co	Brill "Exhaust"	Nichols-Lintern type C	Nichols-Lintern	Globe
Wheels, type	Rolled steel, 26 in	Cast iron, 26 in	Rolled steel, 28 in	Rolled steel, 33 in	Wrought steel, 36 in.
Wheelguards or fenders	H B type	H B type	Pilot type	Steel pilots	Pilots

Bus Deliveries Continue in Steady Volume

In spite of a continued industrial inactivity in many lines, the purchase and delivery of buses and trolley buses by electric railway properties and their subsidiaries has continued at a steady level, according to advices received from manufacturers. General Motors Truck Company reports deliveries for May as the largest in the company's history, with good prospects that the record would be continued in July and August.

Among the larger deliveries reported by this manufacturer were 127 buses for city service, Type "250," to Public Service Co-ordinated Transport; ten Type U, 21-passenger city service buses to the Reading Transit Company; fourteen Type Z-225 buses to Toronto Transportation Commission; ten Type "250," 33-passenger observation parlor buses to the People's Rapid Transit Company, Philadelphia; four Type Z, 29-passenger city service buses to Washington Railway & Electric Company; one Type Z-38, city service bus to Worcester Consolidated Street Railway; and two Type "250," 33-passenger observation buses to Fort Dodge, Des Moines & Southern Transportation Company. The popularity of the Type U, 21-passenger city type bus is attested by the fact that three were delivered to Pittsburgh Motor Coach Company; two to Sioux Transit Company, Sioux Falls, S. D.; five to Georgia Power Company; two to Virginia Public Service Company, for service in Hampton; two to Central Illinois Transportation Company, Springfield, Ill.; and three to British Columbia Electric Railway.

Mack-International Motor Truck Corporation reports deliveries of four 29-passenger city type models to Durham (N. C.) Public Service Company; three of the same type to Fonda, Johnstown & Gloversville Railroad; one to Holyoke Street Railway; two to Public Service Co-ordinated Transport, and one Model BK intercity type bus to Tacoma Bus Company.

White deliveries include eight Model 65A buses to Virginia Electric & Power Company, for service in Norfolk; nine Model 54 buses to West Penn Electric Company; four Model 54A buses to Boston, Worcester & New York Street Railway, of Framingham, Mass.; seven Model 65A buses to Northern Texas Traction Company, of Fort Worth, and three Model 54 buses to Los Angeles Railway.

Among A.C.F. deliveries were five 40-passenger metropolitan type buses to Boston Elevated Railway; three 23-passenger street car type buses to Illinois Power & Light Company; one 40-passenger metropolitan bus to San Diego Electric Railway, and one 23-passenger electric drive street car type bus to Citizens' Transit Company, Oil City, Pa.

Twin Coach Corporation reports deliveries to Boston Elevated Railway of five urban type buses; seven to Schenectady Rapid Transit Company; two 24-passenger buses to El Paso Electric Company; eight 21-passenger buses for city service to Oakland, for Key System Transit Company, and six trolley buses to the Department of Street Railways, Detroit.

◆

One-Man Double-Deck Buses for Baltimore

Baltimore Motor Coach Company, a subsidiary of the United Railways & Electric Company of that city, is to place twelve double-deck electric-drive buses in service. The units, with seating capacity for 68 passengers, will be operated in the Charles Street service, where a grade of 9 per cent must be negotiated. The twelve gas-electric buses are to replace fourteen mechanical-drive buses at present in service.

Before securing the new buses the company made an investigation of the practicability of operating a double-deck gas-electric bus with one man. After tests with a sample equipment and analysis of operating conditions in Baltimore and other cities, it was concluded that such operation was practicable.

◆

Pacific Electric Completes Repair Layout at Long Beach

Representing an investment of $270,000, complete new quarters for the housing, repair and supplying of power to its Long Beach division have been completed by the Pacific Electric Railway. The new facilities replace structures more centrally located, which, due to the phenomenal growth in population of Long Beach, had become too valuable for the purposes used. The new layout is designed to meet not only present but future needs.

The principal structure in the group is a carhouse, which is 77x222 ft. It is substantially constructed with steel frame, corrugated transite siding and roof, steel sash and concrete floor. There are 6,621 lineal feet of trackage and 29,420 sq.ft. of oil macadam paving to serve the various structures. Facilities within the carhouse consist of locker rooms and toilets, shop, store and line department offices and the repair shop. Four car pits are provided, as well as track capacity for the storage of fourteen cars.

In addition to the necessary repair and maintenance equipment, the bus garage, which is 65x77 ft. in size, provides store room, office, locker room and oil room. Storage capacity is also provided for 6,000 gallons of gasoline. The substation unit, which is of fireproof construction, has a capacity of 1,600 kw., supplied by two motor-generator sets, one of 600-kw. and the other of 1,000-kw. capacity. Other structures include a lineman's three-car garage, a four-car concrete wash rack of special design, and a sand house.

Ample fire protection for all units has been provided by placing fire hydrants at suitable locations throughout the buildings and yard. The entire layout was designed and constructed under the direction of the company's engineering department.

◆

New Cars Received by Canadian Property

Three double-truck, double-end motor cars for interurban service on the Windsor, Essex & Lake Shore Railroad, a division of the Hydro-Electric Power Commission of Ontario, were delivered during July by the Ottawa Car Manufacturing Company. The cars, which will seat 50 passengers, are of all steel construction, with arch roofs. Length over all is 51 ft. 2 in., with length over the body posts of 37 ft. 10 in. Over-all width is given as 8 ft. 3 in. Four Westinghouse No. 548 motors are provided, with Westinghouse H.L. control. Weight of the completed unit is given as 63,000 lb. The order also includes a trail car of the same general dimensions. Additional equipment specifications are listed elsewhere in this issue.

Electric Railway Material Prices—July 5, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	12.00
Lead, cents per lb.	5.25
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	4.50
Tin, Straits, cents per lb.	30.25
Aluminum, 98 to 99 per cent, cents per lb.	23.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	41.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$3.90
Somerset mine run, f.o.b. mines, net ton	1.75
Pittsburgh mine run, Pittsburgh, net ton	1.40
Franklin, Ill., screenings, f.o.b. mines	1.60
Central, Ill., screenings, f.o.b. mines	1.25
Kansas screenings, Kansas City	1.85

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive 9/16 in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.08
Angles bars, cents per lb	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.80
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.20
Sheet iron (24 gage), cents per lb.	2.55
Sheet iron, galvanized (24 gage), cents per lb.	3.20
Galvanized barbed wire, cents per lb.	2.85
Galvanized wire, ordinary, cents per lb.	2.80

Waste—New York

Waste, wool, cents per lb.	10.00 to 15.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	9.00 to 12.00
Colored	6.00 to 10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.2
White lead in oil (100 lb. keg), cents per lb.	13.75
Turpentine (bbl. lots), per gal.	0.54
Putty, 100 lb. tins, cents per lb	5.725

Wire—New York

Copper wire, cents per lb.	13.75
Rubber-covered wire, No. 14, per 1,000 ft.	$5.05
Weatherproof wire base, cents per lb.	14.00

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	9.25
Light copper, cents per lb.	8.00
Heavy yellow brass, cents per lb.	5.50
Zinc, old scrap, cents per lb.	2.00
Lead, cents per lb. (heavy)	3.75
Steel car axles, Chicago, net ton	$15.25
Cast iron car wheels, Chicago, gross ton	13.75
Rails (short), Chicago, gross ton	14.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	6.50

THERE CAN BE NO BETTER EMERGENCY BRAKE THAN

PEACOCK STAFFLESS BRAKES

Peacock Staffless are Powerful—72 lb. brakes exert 3000 lbs. braking force.

Peacock Staffless Brakes are fast—12 ft. of chain can be wound up in a matter of a fraction of a second. Never clog.

Peacock Staffless Brakes require practically no maintenance.

Peacock Staffless Brakes assure Safety in any emergency.

NATIONAL BRAKE COMPANY

890 Ellicott Square,
Buffalo, N. Y.

Canada:—
Lyman Tube & Supply Co., Ltd., Montreal

General Sales Office:
50 Church Street, New York City

ANOTHER Convention has come and gone. Another Coffin Award has been made. And now the name—Youngstown Municipal Railway Company—has been added to the "honor roll" of the industry.

Such honor to Youngstown is deserved! The thoroughly modern aspect of its equipment and the excellence of its service is evident even to the casual visitor in Youngstown. One does not have to be a transportation expert, neither need one read the Brief submitted for the Coffin Award to know that an outstanding piece of work is being done on the local transportation service of Youngstown.

In this Ohio community, the finest modern cars and improved

METAL & THERMI

Pittsburgh **Chicago** **Boston** 120 BROADWAY

CONGRATULATIONS YOUNGSTOWN!

- 1923 * Chicago No. Shore & Mlw. R. R.
- 1924 Northern Texas Traction Co.
- 1925 * Pittsburgh Railways Co.
- 1926 * Pennsylvania-Ohio Elec. Co.
- 1927 * Grand Rapids Railroad Co.
- 1928 * Va. Electric & Power Co.
- 1929 Chicago, So. Shore & So. Bend R. R.
- 1930 * Youngstown Municipal Ry. Co.

***THE SCORE IS NOW**

6 out of 8

In the eight years history of the Coffin Award the Metal & Thermit Corporation is proud to note that six of the winners have been regular users of the Thermit rail welding process.

methods of operation have been used to foster better public relations. This has been so successful, that this property has recently been granted a franchise generally conceded to be one of the best in the Country.

In carrying out its program of furnishing the best possible local transportation, Youngstown has not neglected its track. Rather it has handled it so as to give the best possible quiet, smooth riding, long-lived track. Naturally Thermit rail welding has been an essential part of this program. In fact Youngstown has been a regular user of the Thermit-welding process since 1916—fourteen years a satisfied user.

THERMIT

CORPORATION

NEW YORK, N.Y. **South San Francisco** **Toronto**

A major expense becomes a minor maintenance item *with*

CAR wheels rank fourth in the annua purchases of the average large Electric Railway System. Approximately $1575 per million car miles is spent for ca wheels.* This, of course, is the *average* ca wheel. Furthermore, it represents only the purchase price and does not include the hig maintenance item of removing, re-turning an replacing car wheels.

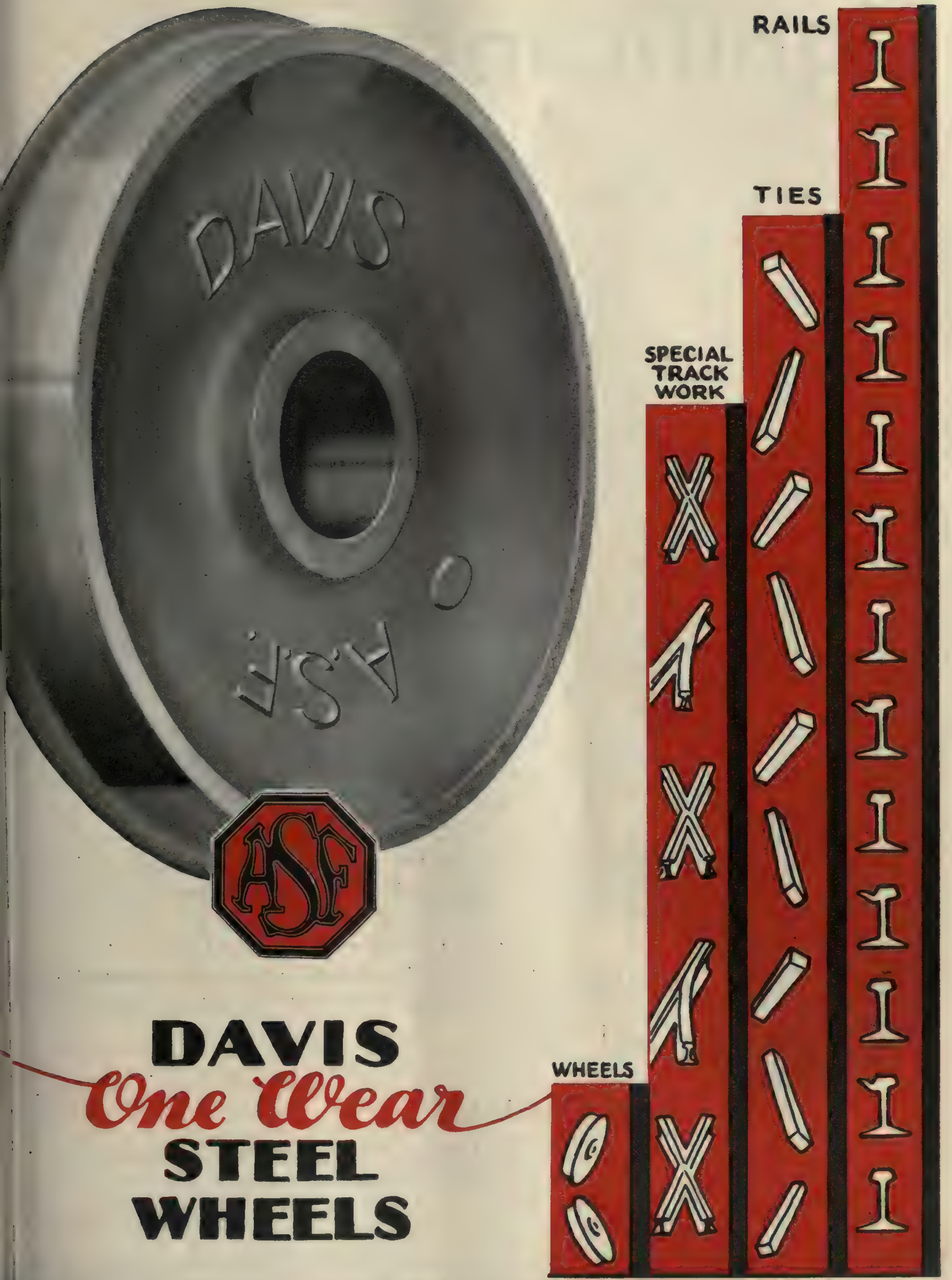
Davis "One-Wear" Steel Wheels will entirely eliminate the latter expense and at th same time materially reduce this major item o Railway operation, car wheel purchases.

One wear means one installation cost. A special composition—triple heat treated stee —provides greater mileage and longer life.

If your figures meet the average it will pay yo to investigate Davis "One-Wear" Steel Wheels

*From Electric Railway Journal

AMERICAN STEEL

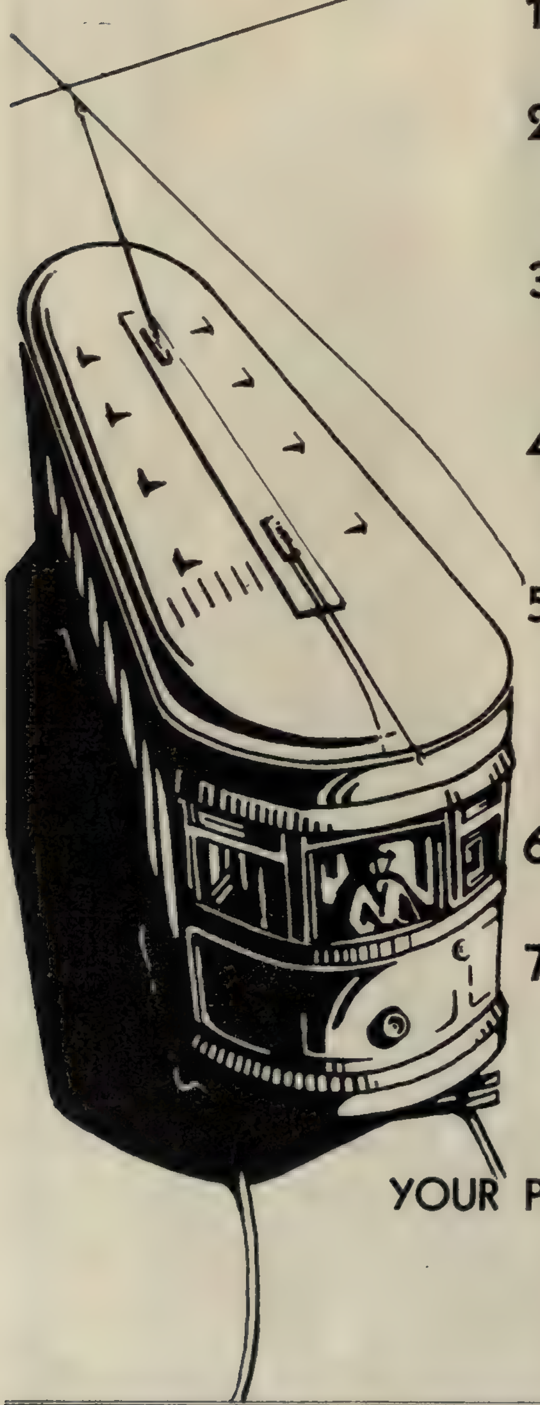


DAVIS
One Wear
STEEL
WHEELS

FOUNDRIES
NEW YORK CHICAGO ST. LOUIS

Significant Facts

about Electric Railways of Today



1 "Street cars remain supreme in the field of urban rapid transit."

2 "At the present time the electric railways handle an average of one-third of the entire population of this country daily."

3 "The average street car passenger occupies about eight square feet of street space as compared with fifty feet occupied by the average private automobile passenger."

4 "Parked cars in city streets do not buy goods, do not work in factories and offices, do not patronize theatres. Street car passengers do."

5 "Cash fare per person for an unlimited distance now stands at 8.4 cents in 248 cities of 25,000 or more population. The average automobile owner must pay almost that for every mile he rides if depreciation as well as up-keep cost is included."

6 "Electric railways continue to set even higher standards of comfort, convenience, safety and speed of travel."

7 Consolidated equipment and engineering service can assist your electric railway to maintain and coordinate these modern standards of comfort, convenience, safety and speed.

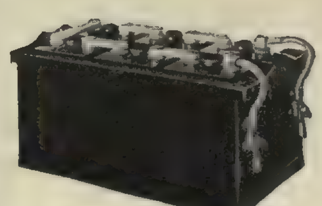
YOUR PROBLEMS...

In—Car-Heating...Door-Operation...Car-Signalling
...Safety Control of Auxiliary Car-Circuits

...OUR SPECIALTY

CONSOLIDATED CAR-HEATING CO., INC.

NEW YORK ALBANY CHICAGO



BUILT FOR HEAVY DUTY

The new Exide Motor Coach Battery is the product of 42 years' experience in building batteries for every purpose. It is constructed to function reliably, steadily and *economically* . . . and the new composition case is built to withstand mud, water, acid, hard knocks. No matter how tough the service, Exides will do their work dependably. That's why so many fleet operators standardize on Exide Motor Coach Batteries.

Exide
MOTOR COACH BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE
Exide Batteries of Canada, Limited, Toronto

KNOXVILLE

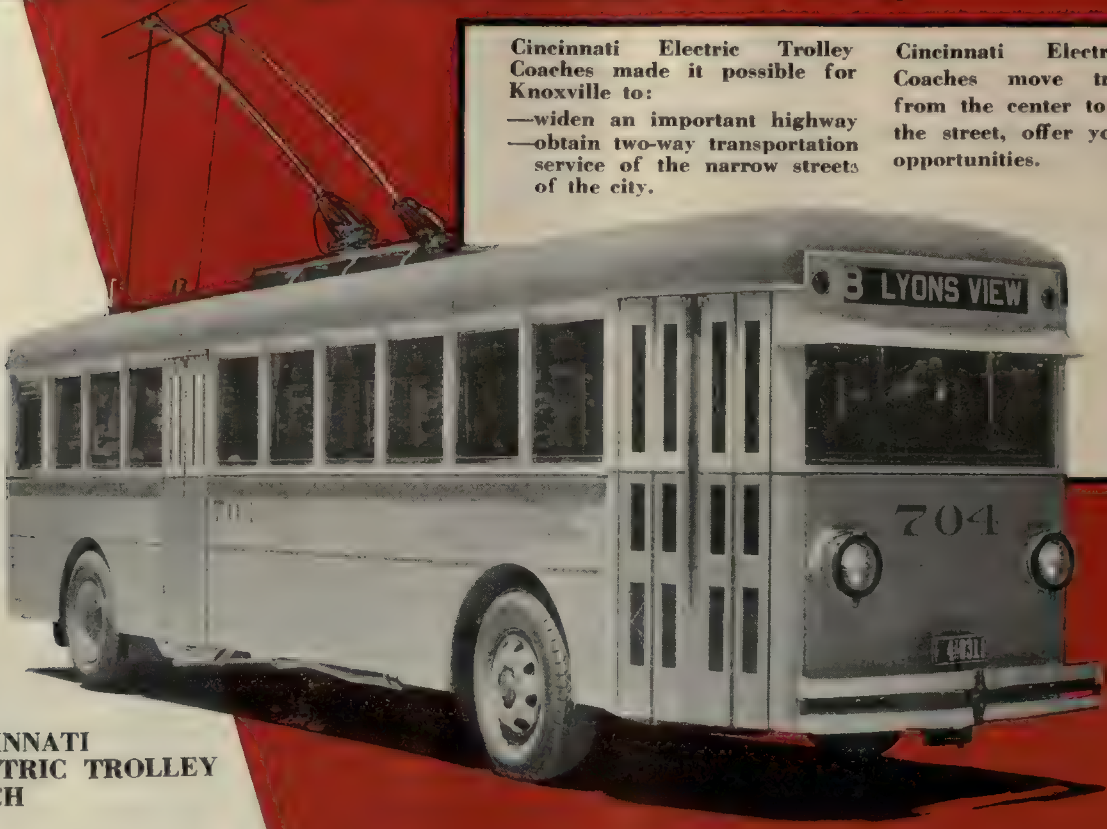
.. Recognized Opportunity ..
THE SAME IS OFFERED TO YOU

Cincinnati Electric Trolley Coaches made it possible for Knoxville to:

—widen an important highway

—obtain two-way transportation service of the narrow streets of the city.

Cincinnati Electric Trolley Coaches move transportation from the center to the side of the street, offer you the same opportunities.



CINCINNATI
ELECTRIC TROLLEY
COACH

NEW ORLEANS

PUBLIC SERVICE, INC

BUY
ELEVEN CINCINNATI
ELECTRIC TROLLEY COACHES

CINCINNATI CAR CORP

BALTIMORE

Orders

CINCINNATI CARS

As part of their program of expansion and modernization

UNITED RAILWAYS
& ELECTRIC COMPANY
BALTIMORE, MARYLAND
Purchased
CINCINNATI CARS

of the type illustrated above. They have proved best for Metropolitan service and mass transportation

TION····CINCINNATI·OHIO

169 COACHES

GOODYEAR TIRES ARE USED ON THE ENTIRE FLEET OF CONNECTICUT COMPANY, NEW HAVEN, CONN.

ALL ON GOODYEARS

When such large operators as Connecticut Company consistently use one brand of tires, it stands to reason these tires must give greater satisfaction, better service than any others.

And when, from coast to coast, you find more motor coaches operating on Goodyear Tires than on any other kind — you can reach only one conclusion: Goodyears must be measurably superior.

Goodyear Tires have the extra safety and added traction of the All-Weather Tread. They have the stamina, the endurance, the extra resilience of Supertwist. Goodyear pioneered the Bus and Truck Balloon — now rapidly becoming standard equipment for long distance and maintained speed.

Whether you want mileage, safety, comfort, freedom from road delays — or all these advantages combined — Goodyears are the tires for your fleet.

THE GREATEST NAME IN RUBBER

GOODYEAR

ON YOUR NEW MOTOR COACHES SPECIFY GOODYEARS

Mack

4 and 6 cylinder buses meet every economic need of the industry—

...increased sales prove it

Mack Model AB, now offered exclusively for city service, is the outstanding four-cylinder bus in the field today, just as it has been for the past ten years. Designed for capacity of 25 to 29 passengers.

More than 650 operators have purchased close to 3,700 AB four-cylinder buses, and 1,200 of these have each given more than 500,000 miles of profitable service.

An unprecedented volume of repeat orders is evidence that the AB means lower cost of operation and maintenance where road and load conditions are such that four-cylinder performance is adequate.

Mack

Model AB, 4-cylinder
for City Service
25 to 29 Passengers

Mack Buses are complet

Mack Model BC is the logical solution to problems confronting city and interstate operators, where routes are such that four-cylinder performance is inadequate, yet where revenue does not warrant the use of larger sixes.

The advent of Model BC, an "Intermediate Six" for city or interstate service, with power and speed to maintain difficult schedules means greater operating economy and GREATER PROFITS. Capacities for city service, 29-33 seated passengers—for interstate service, 25-29 passengers.

Mack Model BC is designed in every detail and from every standpoint of power, speed, economy and comfort to profitably fill a long-felt need in the bus industry.

Mack

Model BC, "Intermediate Six"
for City or Interstate Service
29-33 Passenger City Service
25-29 Passenger Interstate

Mack Built—Body and Chassis

Mack Model BK is the Big Six of the Mack line with a 126 hp. Mack-built engine. For mass transportation—up to 41 passengers in city service and 33 passengers with an interstate body, it is the finest bus of its type on the road today—superior in performance, unmatched for luxury, comfort and appearance. It is the result of 30 years of concentrated effort in building highway, freight and passenger-carrying commercial vehicles.

Mack Model BK heavy duty bus is especially engineered and completely Mack built—chassis and body—for the rigors of high-safe-speed service. It offers the utmost not only in passenger appeal but also in economy of operation and maintenance.

Mack

Model BK, 6-cylinder
City or Interstate Service
33 Passenger Interstate
41 Passenger City Service

Mack Buses are completely Mack Built—Body and Chassis

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

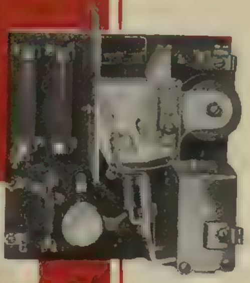
Utility

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

Heating Regulating and Ventilating Equipment

KANSAS CITY ERIE MINNEAPOLIS OMAHA TOLEDO CHICAGO PROVIDENCE CONCORD ST. LOUIS

UTILITY HEATER
Fitted with Chromalox
Enclosed Elements



UTILITY LATEST
No. 10 HEAT
REGULATING
MAGNETIC SWITCH

PHILADELPHIA ATLANTA BOSTON HARTFORD NEWARK UTICA DULUTH DENVER DALLAS NEW ORLEANS TRENTON CITY PUBLIC SERVICE INDIANAPOLIS LINCOLN

UTILITY
EXHAUST
VENTILATOR

UTILITY
INTAKE
VENTILATOR

UTILITY
THERMOSTAT
Keeps the
Temperature
Uniform
Within 2°

SAN FR TTLE MADIS WICHITA MILWAUKEE TORONTO BUFFALO DETROIT CLEVELAND CINCINNATI ALBANY QUEBEC

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

MORE than 26,000 cars in these and hundreds of other cities throughout the United States and Canada are equipped with Utility Heating with Chromalox Strips, Regulating, and Ventilating Systems. They have been proven in all climates under all weather conditions—their design is the result of many years' experience in this wide field. They are successful from the operator's standpoint both in economy of electrical energy and in the revenue-building comfort assured.

Let us tell you the details about Utility advantages.

Car Comfort
with
Utility
Heaters
Regulators
Ventilators

RAILWAY UTILITY COMPANY

New York 2241 TO 2247 INDIANA AVE. CHICAGO, ILLINOIS Montreal, Can.

Carrying 12,000,000 Passe

The huge fleet of more than a hundred buses operated by Community Traction Company of Toledo, Ohio, carries more than 12,000,000 passengers yearly through 3,700,000 miles of congested city traffic over twenty routes, and maintains an average speed of 11.6 miles an hour.

When you demand such strenuous service as this from your buses—the high speed under extreme heat, heavy loads, quick and frequent starting and stopping—the only safe thing to do is to use lubricants and fuels that have *proved* their ability to stand up and protect under these conditions.

That is why Community Traction Company uses Cities Service products. Their quality has been tested in the most practical proving ground in America—the Cities Service own fleet of more than 4000 motor vehicles of all types, operating under all sorts of driving conditions. Their quality continues to be demonstrated in hundreds of bus fleets throughout the country.

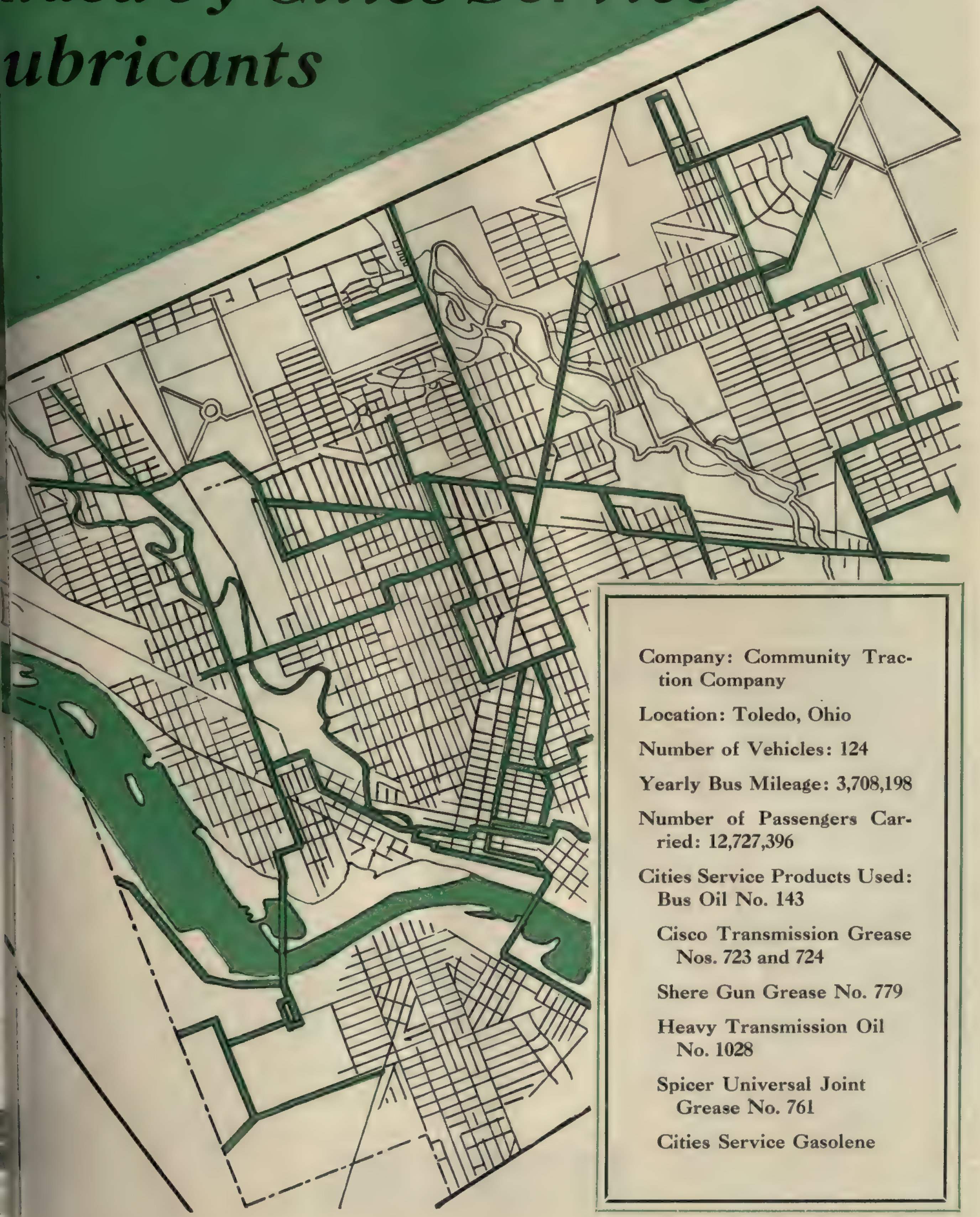
Cities Service bus experts and Cities Service products are available, on request, to all bus operators.

CITIES SERVICE COMPANY

60 Wall Street New York City

KOOLMOTOR PRODUCTS

ers Through Toledo Traffic
ided by Cities Service
ubricants



Company: Community Traction Company

Location: Toledo, Ohio

Number of Vehicles: 124

Yearly Bus Mileage: 3,708,198

Number of Passengers Carried: 12,727,396

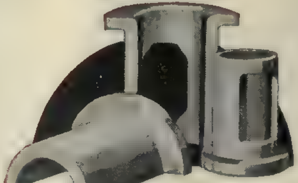
Cities Service Products Used:
Bus Oil No. 143
Cisco Transmission Grease Nos. 723 and 724
Shere Gun Grease No. 779
Heavy Transmission Oil No. 1028
Spicer Universal Joint Grease No. 761
Cities Service Gasolene

Lea

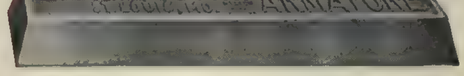
“NATIONAL”
PRODUCTS

Trolley Wheels
and Harps

The “Vigne” Bimetallic
Armature Bearing



“Tiger” Bronze Axle and
Armature Bearings



M-J Armature Babbitt

ng to Greater Savings

In using National Bearing Metals' products, traction companies are opening up new avenues of economy. The reason why is most obvious. National Bearing Metals' products are of proper quality and, design to meet the needs of modern operation. It is a result of our long study of your problems. We have been identified with the electric traction industry for fifty-five years in supplying quality equipment. Today our huge resources, including engineering talent, machinery, laboratories, etc., is an indication of our continuous efforts to furnish certain equipment that unfailingly leads to greater operating savings.

Our specialists will willingly cooperate with you and give you the benefit of their long experience. Prices and full details submitted upon request.

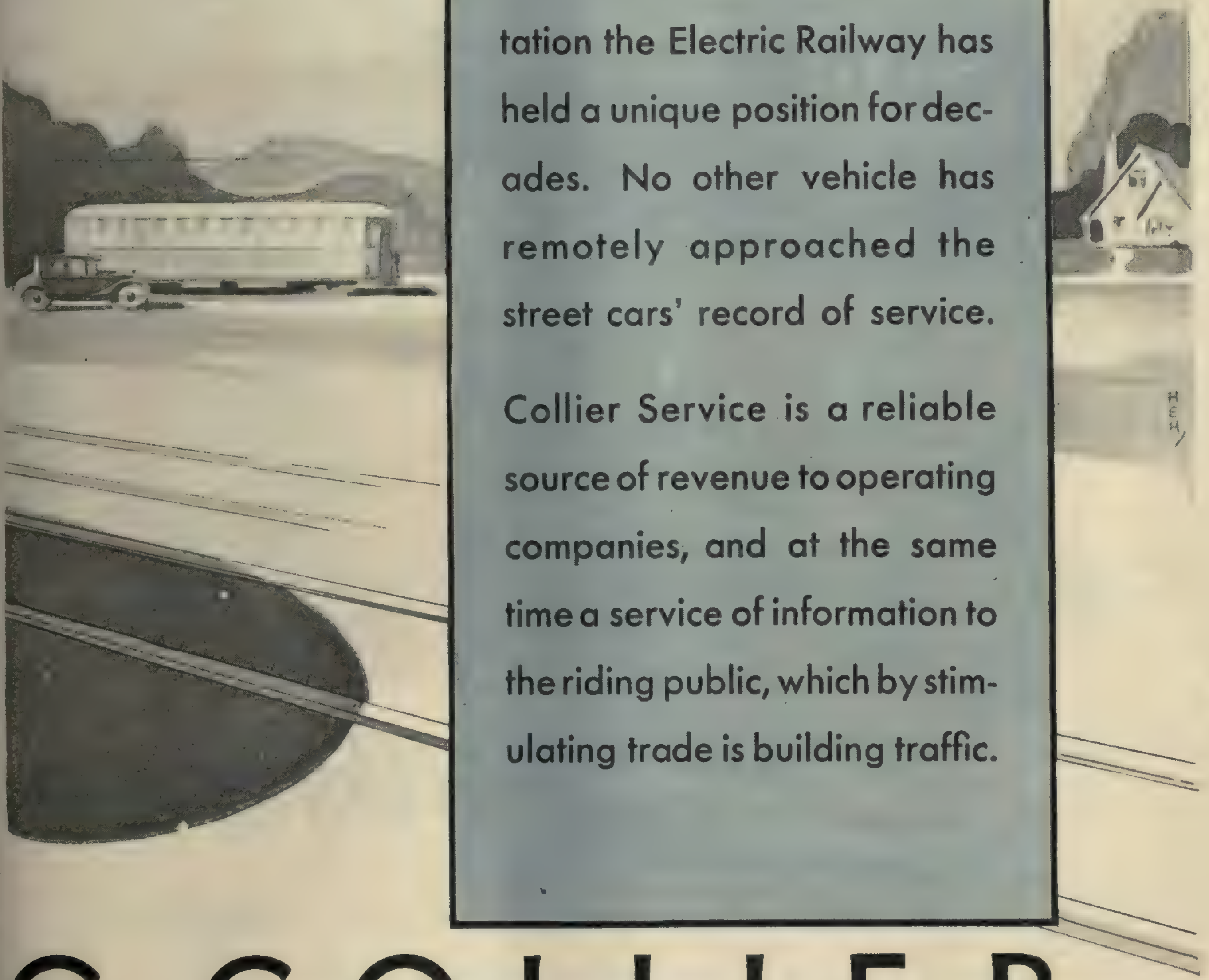
NATIONAL BEARING
METALS CORPORATION
More-Jones Division
ST. LOUIS, MO.

New York, N. Y. Jersey City, N. J. Pittsburgh, Pa.
Meadville, Pa. Portsmouth, Va. St. Paul, Minn.

LEADE

BARRON

RSHIP



In the field of mass transportation the Electric Railway has held a unique position for decades. No other vehicle has remotely approached the street cars' record of service.

Collier Service is a reliable source of revenue to operating companies, and at the same time a service of information to the riding public, which by stimulating trade is building traffic.

G. COLLIER
INC.

NEW YORK CITY

The

CORNER STONE

of trolley-bus

transportation

TIMKEN *Worm Drive*

DTA CO

AXLES

DEAD silence, dependability, long life, low operating cost; proved through two decades as ideal equipment in all passenger—revenue—transportation.

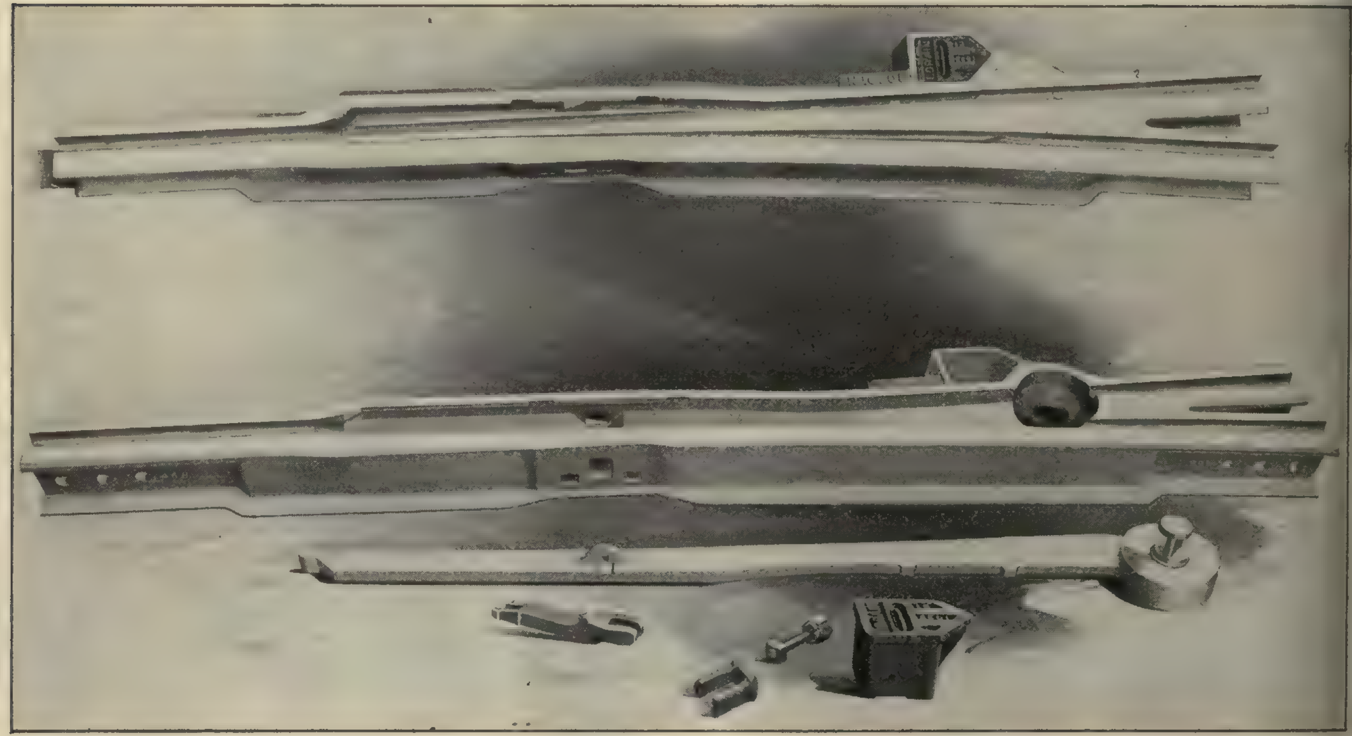
AMERICAN CAR COMPANY
AMERICAN CAR & FOUNDRY MOTORS COMPANY
THE CINCINNATI CAR CORPORATION
ST. LOUIS CAR COMPANY
TWIN COACH CORPORATION

all these concerns build trolley-buses with Timken Front and Timken Worm Drive Axles as standard equipment.

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

LORAIN

TRACK SPECIALS



Manganese Tadpole Tongue Switch With One-inch Deep Heel Bearing . . .

The main casting and tongue are built for durable service of Lorain quality Manganese Steel. A heavy reinforced grooved tongue is furnished in all "Tadpoles" of 75 feet, or greater, center radius.

The Lorain Steel Company originated this type of switch, now the recognized standard throughout the world.

Electric traction experience has proved their fine quality as well as their dependability.

Quotations furnished promptly upon request
from our nearest District Sales Office:

THE LORAIN STEEL COMPANY

JOHNSTOWN, PA.

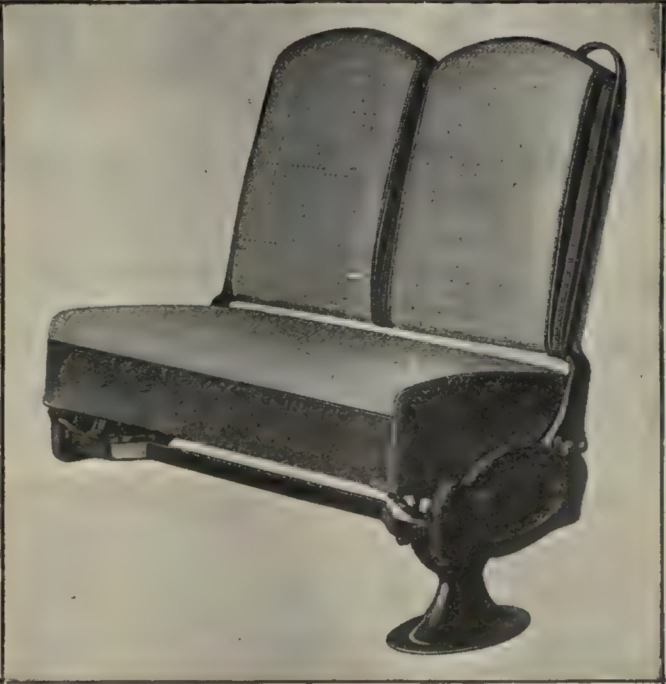
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY	CARNEGIE STEEL COMPANY	ILLINOIS STEEL COMPANY	THE LORAIN STEEL COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY	CYCLONE FENCE COMPANY	MINNESOTA STEEL COMPANY	TENNESSEE COAL, IRON & R. R. COMPANY
AMERICAN STEEL AND WIRE COMPANY	FEDERAL SHIPBUILDING AND DRY DOCK COMPANY	NATIONAL TUBE COMPANY	UNIVERSAL ATLAS CEMENT COMPANY

Pac. Coast Distributors—United States Steel Products Co. Columbia Dept., San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Co., New York City

LORAIN SALES OFFICES—Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh



A Comfortable, Sanitary and Modern Seat!

HERE is a seat which maintenance engineers will appreciate. Its close-woven cane webbing back and cushion are easy to keep clean. The genuine leather facing on the cushion reinforces the seat at the greatest point of wear. In addition, the individual backs and deep, spring cushions are shaped to allow proper posture and leg freedom. Mechanism rails are set in and the frame of the chair is made of selected Northern hard-grained ash, further strengthened by malleable iron braces. Write to the nearest Heywood-Wakefield sales office for complete details of the 327-M Special and other popular bus and electric railway seats in our line.

If you have not received a copy of our new Bus Seat Catalogue, write for it.

HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.

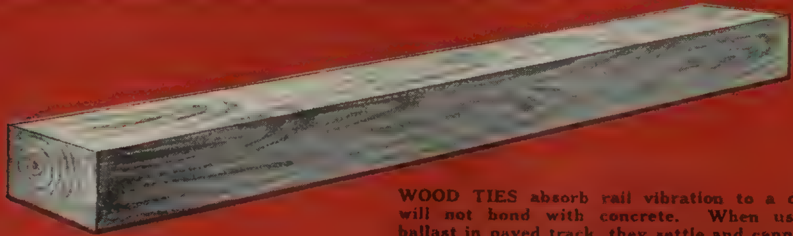
439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

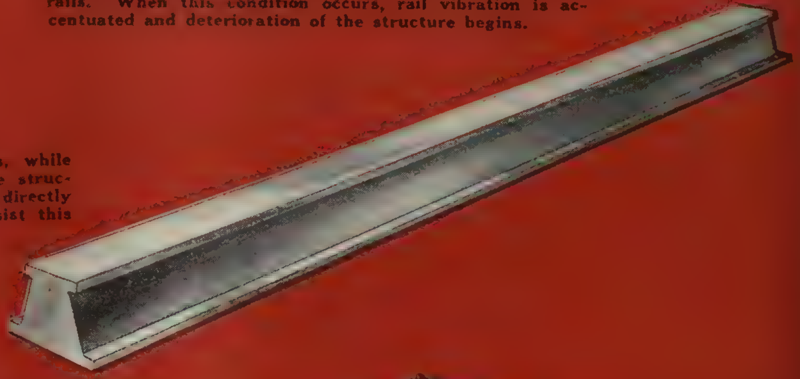
DAYTON TIES

give you *everything* you need

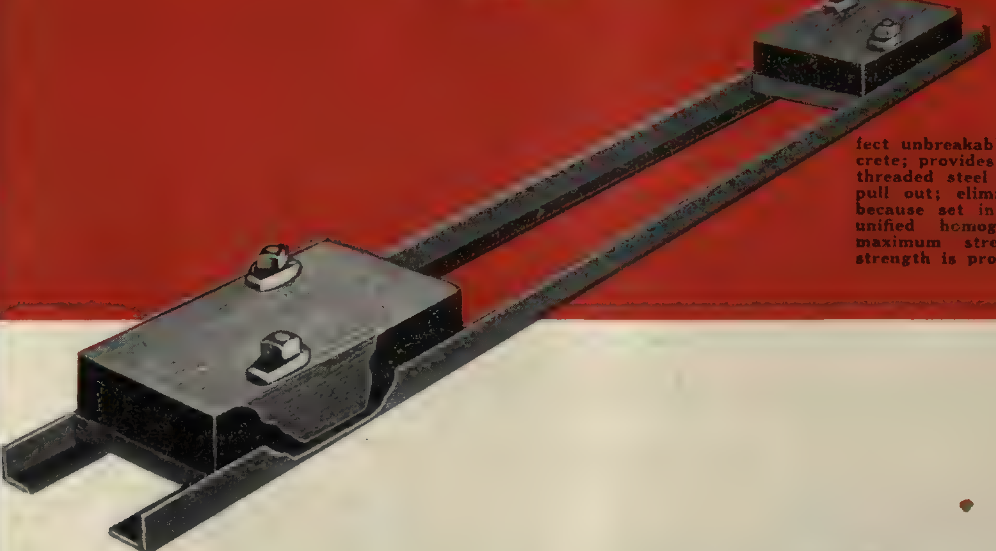
ESSENTIALS THAT NO OTHER TIE, WOOD OR STEEL PROVIDES... DAYTON TIES GO ALL THE WAY



WOOD TIES absorb rail vibration to a degree but they will not bond with concrete. When used with gravel ballast in paved track, they settle and cannot be corrected; they cannot be spiked tight to prevent loosening of the rails. When this condition occurs, rail vibration is accentuated and deterioration of the structure begins.



STEEL TIES other than Dayton Ties, while providing initially a reinforced concrete structure, place the burden of rail vibration directly on the concrete. Concrete will not resist this force without gradual disintegration and consequent breaking of bond with the tie. Thus the theoretical strength of the steel reinforced concrete is nullified.



DAYTON TIES provide every essential. The white oak block set in fibrous asphalt positively dissipates rail vibration; protects and maintains a perfect unbreakable bond with the concrete; provides bolts and clips, screw threaded steel to steel that will not pull out; eliminates ballast settling because set in concrete; provides a unified homogeneous structure of maximum strength because that strength is protected.

FOR want of a nail the shoe was lost, is an old adage that particularly applies to the problem of track structure as developed in paved street practice.

With many engineers, the one problem of vibration absorption seems to hold major consideration. This, while admittedly, a most important problem, is not the whole problem by any means. The use of wood ties, therefore, while correcting to a degree one problem, has created contingent problems that largely cancel its major advantage.

With other engineers, the merit of a strong, unified structure of reinforced concrete presents an inviting picture. But while theoretically plausible, such structures automatically negate their initial strength, when they ignore the principle that vibration must be absorbed if the strength of the structure is to be maintained.

A growing number of engineers, however, are not satisfied to go half way. They realize that a track structure must meet every problem, major and minor, if any one difficulty is to be adequately solved and that no one problem can be isolated from contingent problems, without inviting a most undesirable result. To no other reason can be accredited the tremendous swing to Dayton Ties—*the only tie on the market that goes all the way—the only tie on the market that provides an answer to every problem.*

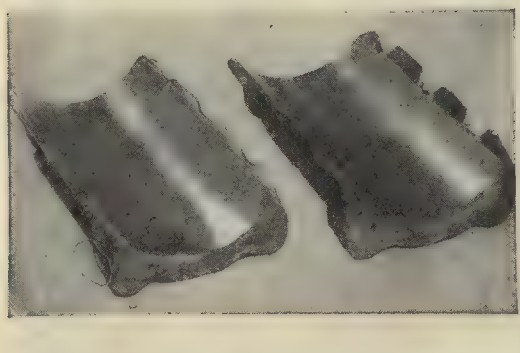
That is why Dayton Ties give longest years of life—lowest cost per mile per year and lowest first cost of construction. You engineers who have gone part of the way with wood ties, who know the importance of absorbing rail vibration. You engineers who have gone part way with other steel ties and feel the need for a steel reinforced structure, *why not go all the way with Dayton Ties* and get the advantages of both wood or steel ties without a single solitary compromise to what you consider essential. There is a nearby property where you may see for yourself what it means to go all the way. Let us tell you where it is.

The Dayton Mechanical Tie Co.
Dayton, Ohio

These are pictures of Dayton Ties after many years of service. They illustrate the rule, not the exception. Smooth—virtually maintenance free—enduring.

THE DAYTON INTEGRAL SYSTEM OF TRACK AND PAVING STRUCTURE

Costs are going Down



ELECTRIC Railway operating costs have been permanently lowered. An entirely new lubrication system has been developed and is being put into effect on many of the country's leading roads. A number of the most progressive railway companies have completely revolutionized their former lubrication practices. Very substantial savings have been effected.

■ The new system of car lubrication and new electric railway lubricant, differing in every physical quality from the lubricants in use for many years past, are offered to the industry by The Texas Company. Tests on your own lines will gladly be arranged.

■ There is no uncertainty. Unmistakable proof of the lower power costs, lower labor costs, reduced maintenance costs, remarkable reduction in waste consumption and entirely new freedom from bearing troubles is a matter of record—not on any one road alone, but on every electric railway system where the new lubrication has been adopted.

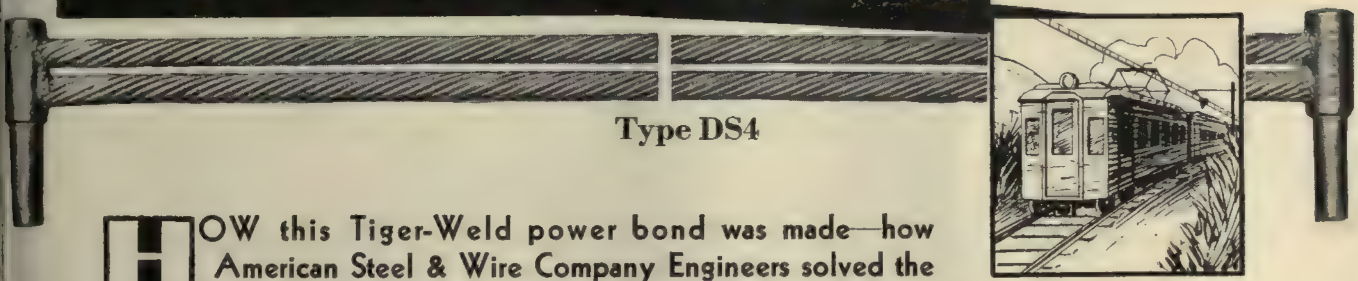
■ The Texaco System of Lubrication and Texaco Lovis Oil are rapidly displacing all other methods and all other lubricants.

Write the Texas Company for facts and figures.

TEXACO LUBRICANTS

THE TEXAS COMPANY
135 East 42nd Street, New York City

NOW..a new Power Bond with Strength to Spare ..Yet Capable of Carrying Necessary Current Loads..



Type DS4

HOW this Tiger-Weld power bond was made—how American Steel & Wire Company Engineers solved the problem of strength—without sacrificing the ability to carry necessary current—is a story of achievement that you will want to know about in detail. Especially so—since its inception means increased efficiency and lower operating costs. It will pay you to write for interesting literature and detailed information.

Designed for use on multi tracked A. C. systems. The Pennsylvania Railroad adopted Type DS-4 Bonds for the electrification from North Philadelphia to Trenton and Norristown.

TIGER-WELD POWER BONDS

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY UNITED STATES STEEL CORPORATION

208 S. La Salle Street, Chicago 30 Church Street, New York

Other Sales Offices: Atlanta Baltimore Birmingham Boston Buffalo Cincinnati Cleveland Dallas Denver Detroit Kansas City Memphis Milwaukee Minneapolis-St. Paul Oklahoma City Philadelphia Pittsburgh Salt Lake City St. Louis Wilkes-Barre Worcester

U. S. Steel Products Co.: San Francisco Los Angeles Portland Seattle Honolulu

Export Distributors: United States Steel Products Co., 30 Church St., New York City

301,600 *Trips in* 1929

OR ALMOST

4 Million Bus Miles

TO SERVE THIS GREAT CITY

AND ITS SUBURBS

Photo by Fairchild Aerial Surveys

●

The City Transit Company, serving the city of Cincinnati and its suburbs, made 301,600 trips during 1929 with loss of but 10 trips due to tire delays. True Silvertown performance!

●

MR. C. S. WARNER, President, City Transit Company, Norwood, Ohio, makes known the facts about Goodrich Tires, used 100% on their extensive bus operations.

"The City Transit Company's operation renders a comprehensive bus service in the City of Cincinnati and its suburbs. Naturally, tires and tire service are of major importance because our schedules are frequent.

"This year we have developed a remarkable record. From January 1, 1929, to December 1, 1929, out of a total of 3,784,007 miles covered, we have lost but ten trips due to tire trouble. And any delay means the loss of at least ½ trip.

"We are glad to make known these facts for we believe that such a record would have been impossible if real quality and high mileage had not been built into Goodrich Tires."

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ontario.

7 Superior Specifications
Built into Every
Heavy Duty Silvertown

1. Heavily insulated stretch-matched cords.
2. Additional adhesion — from greater insulation between outside plies.
3. Heavy twin beads for better rim seating.
4. Extra gum fillers between plies for longer tire life.
5. Heat-resisting, interlocking cord breakers.
6. Tread designed correctly for heavy duty service.
7. The whole tire toughened by the famous Goodrich "water cure."

Goodrich HEAVY DUTY Silvertowns

• SPECIFY GOODRICH ON YOUR NEW BUSES •

THE LARGEST BUS OPERATORS

SUCH AS—

PUBLIC SERVICE COORDINATED TRANSPORT

FIFTH AVENUE COACH

PHILADELPHIA RAPID TRANSIT

CHICAGO MOTOR COACH

NEW ENGLAND TRANSPORTATION

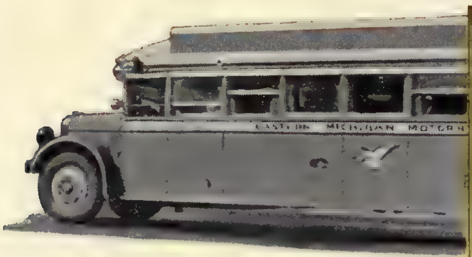
THE GREYHOUND LINES

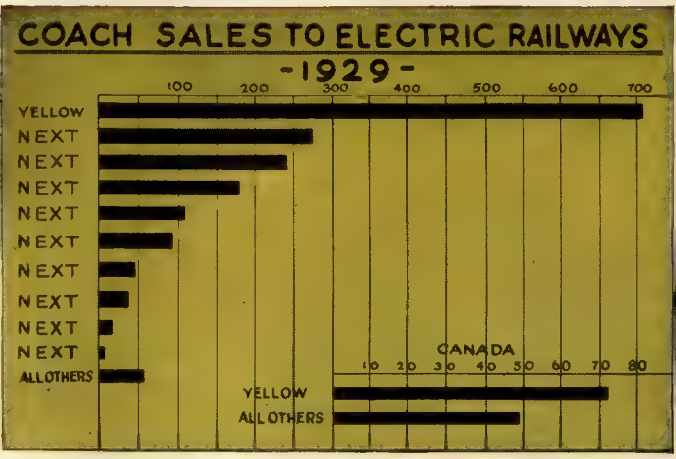
AND MANY OTHERS—

ALL AGREE

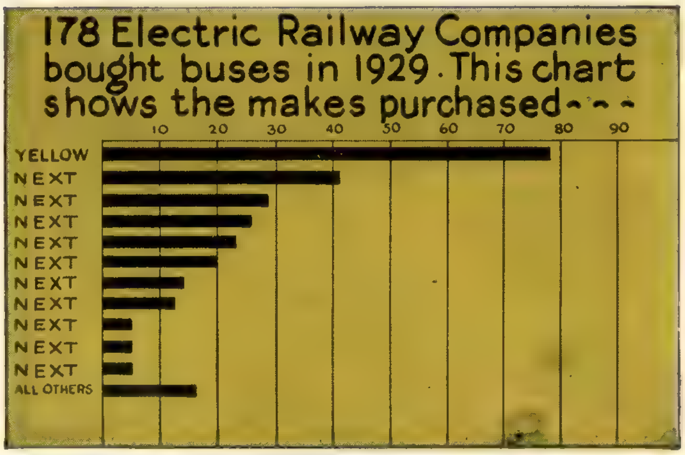
ON YELLOW

with the
ELECTRIC RAILWAY OPERATOR





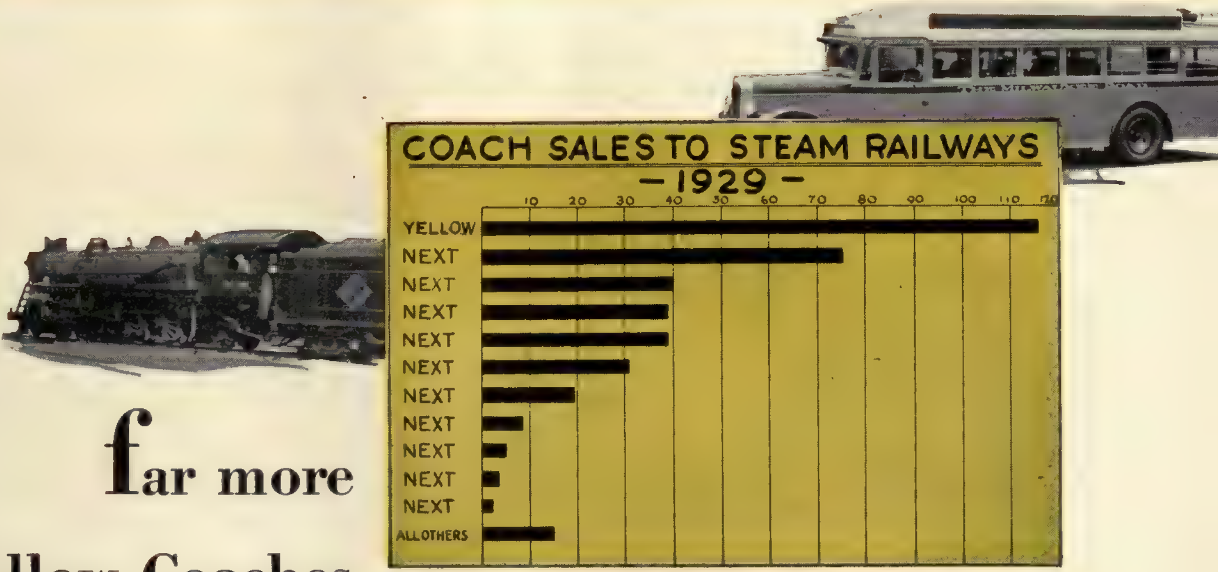
Not only are far more Yellow Coaches bought by Electric Railway Operators than any other make ***but*—**



far more Electric Railway Operators buy Yellow Coaches ***than any other make . .***

and with the

TEAM RAILROAD OPERATORS



far more
Yellow Coaches
are bought by Steam Railways
than any other make.

YELLOW

LEADS BY A WIDE MARGIN

back of
YELLOW EQUIPMENT

BILLIONS OF MILES OF OPERATING EXPERIENCE

UNEXCELLED MANUFACTURING FACILITIES

UNEQUALLED ENGINEERING RESEARCH AND TEST FACILITIES

FAITH IN THE FUTURE OF HIGHWAY TRANSPORTATION

GENERAL MOTORS TRUCK CO., PONTIAC, MICH.

Subsidiary of Yellow Truck & Coach Manufacturing Company

RECOGNITION

SHORTLY after Bus manufacturers began using Art Rattan Seats, they recognized that definite sales value had been added to their products.

Manufacturers of street cars and, now, Trolley Busses, quickly accorded the same recognition to our products.

That the added sales value is no myth is evidenced by the constantly growing demand for Art Rattan Seats.

ART RATTAN WORKS, INC.

Builders of DeLuxe Bus Seats

CLEVELAND . . . . OHIO

Wrap it with Empire

Seamless Bias Tape... *save time and money*

You will find this new varnished cloth ideal for wrapping cable joints, for winding coils, and similar insulating jobs. It comes in long continuous lengths without sewn joints. Best of all, it costs no more than sewn bias cloth and has greater dielectric and mechanical strength.

Waste in time and insulation, that was formerly unavoidable when cutting out sewn seams was the practice, has been banished. This improved insulation is carried in stock in tape form or in rolls 36″ wide, finished black or yellow. Send for a sample.

Complete information is given in Catalog 87. Write for a copy.

MICA INSULATOR COMPANY
New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Works: Schenectady, N. Y. London, England
Cleveland Pittsburgh Cincinnati Birmingham Seattle
San Francisco Los Angeles Toronto Montreal

PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

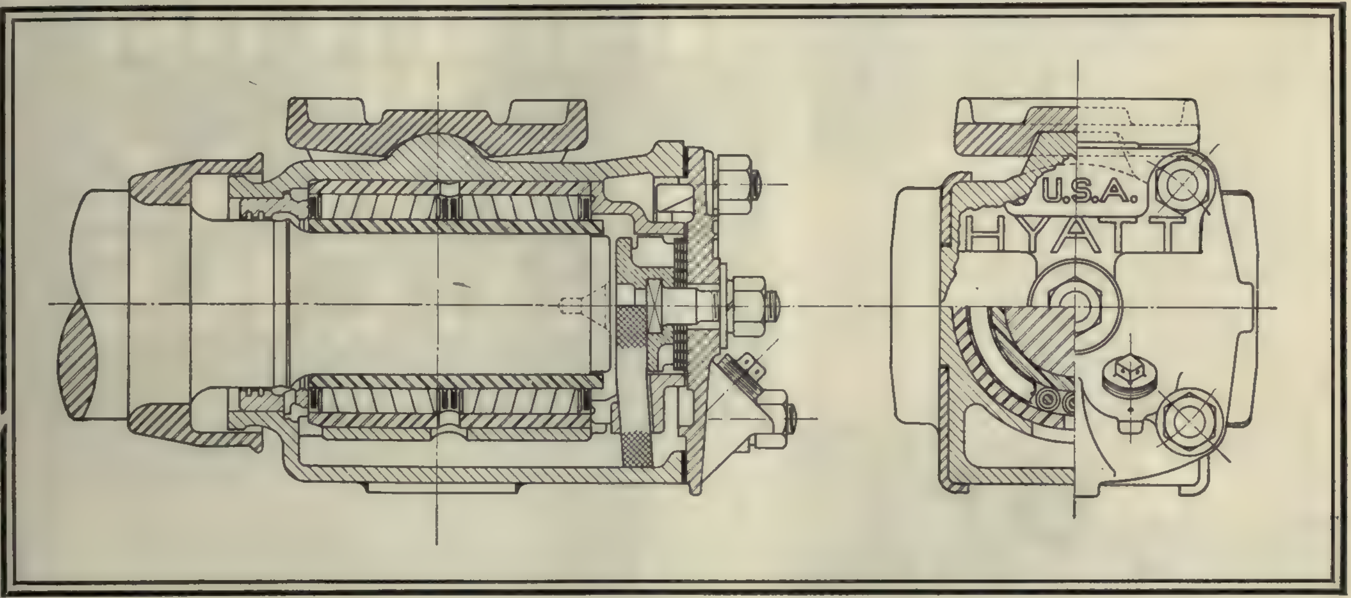
PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF.

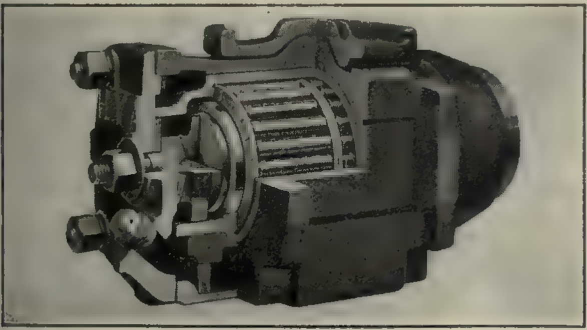
MICA INSULATION OILED CLOTH INSULATION

. . . of interest to Operating Department Executives

The profitable short-haul passenger is more easily attracted by modern Hyatt equipped cars which he knows are more comfortable and conveniently on schedule.

The regular passenger appreciates improvements in service which indicate a thoughtfulness for his comfort and a sincere desire to retain his good will.





Hyatt Roller Bearing Journal Box, designed to reduce maintenance cost and to increase the riding comfort of passengers.

Hyatt Roller Bearings are quiet; they enable even heavily loaded cars to start easily and accelerate smoothly. They help maintain running schedules. Consider them in your modernization program in the interest of operating efficiency and for their profitable effect on passenger revenue.

HYATT ROLLER BEARING COMPANY

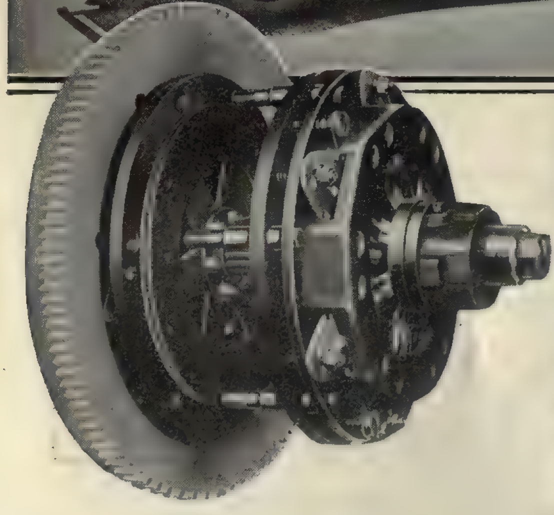
Newark Detroit Chicago Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

LONG CLUTCHES ARE USED ON THE COMPLETE LINE OF AUTOCAR TRUCKS



LONG PRODUCTS
AUTOMOTIVE CLUTCHES
AND RADIATORS

LONG MANUFACTURING CO.
DETROIT MICHIGAN

LONG

WHEELS

FOR THE MODERN STREET RAILWAY

FORGED AXLES

Extreme care is exercised in the manufacture of Bethlehem Axles. Special heat treatment gives them luctility and a high elastic imit. They give excellent ervice under severe torional stresses.

If an electric railway system is to be efficient, the cars must be equipped with good wheels. Wheels that are dependable help to insure profitable operation. Wheels that fail, causing frequent tie-ups, seriously reduce the efficiency of the entire system.

Bethlehem Wrought Steel Wheels meet every requirement of the modern street railway. They are made of high-quality steel. They are rigidly inspected at every step throughout the process of manufacture. They are made with the most exacting care. Five forging and rolling operations are required to produce these wheels. Strength, endurance and wearing qualities are worked into them in the making.

If you investigate Bethlehem Wrought Steel Wheels you will discover these qualities. You will learn how many executives have increased the efficiency of electric railway systems by equipping their cars with Bethlehem Wrought Steel Wheels. Your inquiry will receive prompt attention.

ETHLEHEM STEEL COMPANY

General Offices: **Bethlehem, Pa.**

strict Offices: New York, Boston, Philadelphia, ltimore, Washington, Atlanta, Pittsburgh, ffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

cific Coast Distributor: Pacific Coast Steel rporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

port Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

BETHLEHEM

Wrought Steel Wheels

GARY

WROUGHT STEEL

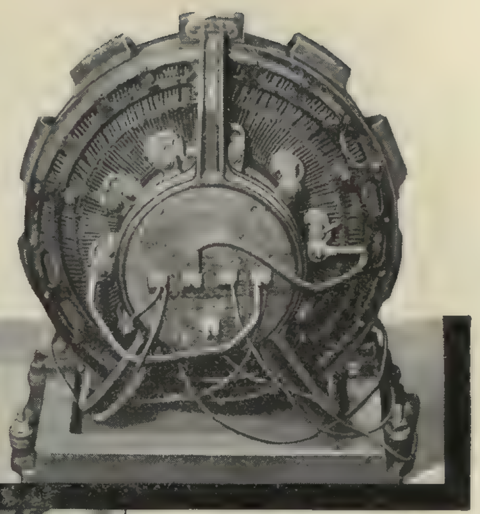
WHEELS

The name ILLINOIS on wrought steel wheels assures the railroads safety, dependability and long life. These three factors all contribute to the success of the Gary Wrought Steel Wheel.

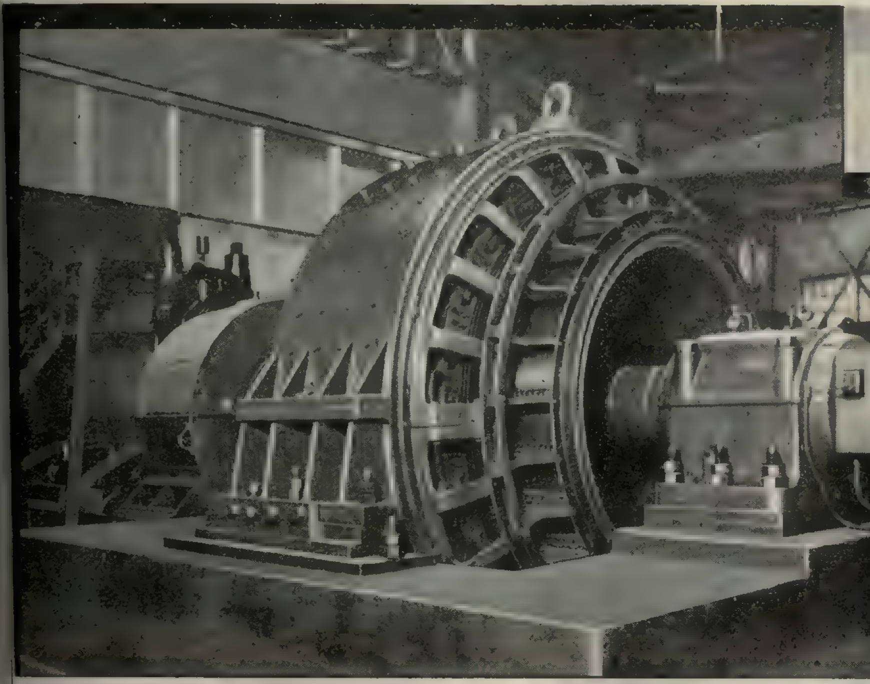
Our Wheel Engineers are at Your Service.

Illinois Steel Company
Subsidiary of United States Steel Corporation
General Offices
208 South La Salle Street, Chicago

stepping up industrial loads



A 3 K. W., 250-volt Waddell-Entz generator built many years ago.



Direct-current reversing steel-mill motor, 7000 H. P., 700-volt, 50 to 120 R. P. M. used to drive a 40-inch blooming mill.

LIGHT UP the candle of industry," wrote Benjamin ranklin. Little did he dream that some of his ientific discoveries would play such an important rt in industry's progress.

Even a hundred years after Franklin, electricity - as far as industry is concerned — was still in the oneer stage. The heavy loads of today were unown when the 3 K. W., 250-volt Waddell-Entz nerator was built. Steel mills and other industrial ads were driven by steam and water.

Now electrical power carries the heavy loads of lustry. "Cut out waste," is the cry. "Reduce mainance costs to a minimum." With this warning out goes inefficient machinery. In comes Garganan equipment like the 7000 H. P. direct-current ersing steel-mill motor, used to drive a 40-inch oming mill. Uninterrupted production is assured.

National Pyramid Brushes played a vital part in nging about this revolutionary progress. The t carbon brush solved a perplexing problem of nmutation and, like the Waddell-Entz generator, de a place for itself in the industrial world. But vas not patterned for modern industry. Like the ly electrical designs it had to undergo great nges to meet the demands of heavier loads, higher speeds, stricter standards of commutation, lower maintenance cost and dependability.

Many of these changes were made possible through scientific research carried on in the thoroughly equipped Research Laboratories of National Carbon Co., Inc. Constant research and steady progress in manufacturing methods have established the position of leadership which National Pyramid Brushes have held from the start.

Systematic inspection and maintenance of brushes, commutator and brush holders insure longer brush life, more satisfactory performance and greater machine efficiency.

To avoid expensive shut-downs, anticipate your requirements for replacement brushes.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

Carbon Sales Division SILVER STRAND CABLE TRADE MARK REGISTERED Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

The Big Swing
is to U. S. Tires

THE FLORIDA MOTOR LINES
OF JACKSONVILLE
–Another great Bus Fleet
equipped with the
U. S. ROYAL
HEAVY SERVICE

UNITED STATES RUBBER COMPANY WORLD'S LARGEST PRODUCER OF RUBBE

The Pickwick Duplex Observation Coach

53

ASSENGER
APACITY

he additional passengers
re clear profit. Duplex costs
more to operate than an
rdinary coach. It depreci-
tes more slowly and costs
ss to maintain. It repre-
ents a potential profit
ncrease of over 300%.

. . . will increase your business and your profit as nothing else can!

WHETHER you want to increase your traffic or increase the profit from the traffic you already have, the most effective single thing you can do is to put the new Pickwick Duplex on your schedules.

Duplex increases your profit. First, because it carries more passengers. The additional fares are clear profit. Duplex costs no more to operate than an ordinary coach. It is easier to service, more economical to maintain. Built by motor coach operators, its features are the result of years of operating experience. It depreciates more slowly. Taking all these factors into consideration, it represents a potential increase in profit of 300% over ordinary equipment.

Duplex will increase your business. Its added comfort, its convenience, its greater safety will bring you new patrons. It is the greatest advertisement you can purchase.

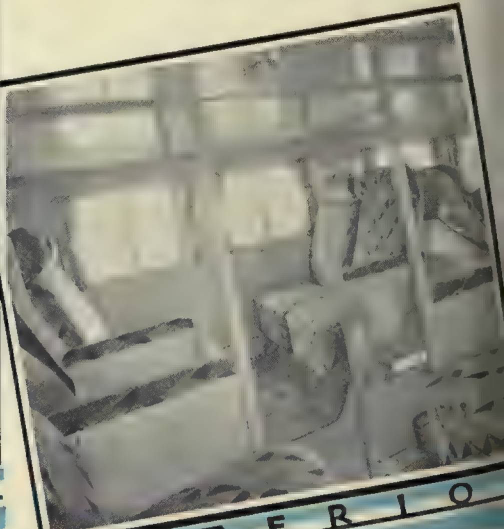
Some of the greatest motor coach operators in the country are now examining their schedules thoroughly, revising them to include Duplex. They are placing orders accordingly. It will pay you to do the same.

THRU THE REAR WHEELS

COMPARTMENT

LAVATORY

REMOVABLE MOTOR



INTERIO

A FEW DUPLEX FEATURES

Removable Power Plant

The Pickwick removable power plant . . . replaceable in its entirety in 15 minutes . . . is one of the greatest advances in operating practice in the history of motor coach transportation.

Fifty-three passenger capacity . . . no increase in size or weight . . . Duralumin and steel construction . . . integral chassis . . . staggered compartments . . . lavatory aboard . . . buffet optional . . . special Pickwick seats . . . portable compartment tables . . . special heating, lighting, ventilating . . . the most comfortable and safest coach on the road . . . built by operators, for operators . . . removable power plant . . . exceptionally high accessibility in both body and chassis . . . low maintenance cost . . . slow depreciation . . . low initial cost. If you have not yet sent for complete specifications and information, send for them now.

PICKWICK MOTOR COACH WORKS, LTD.

(Builders of Pickwick Nite-Coach) INGLEWOOD (Los Angeles) ● CALIFORNIA

General Leathers

the perfect coverings for seats

Public transportation requires the best seat coverings that can be made. They must wear well, they should look attractive, and above all they must clean thoroughly and easily.

General Leathers meet these tests because they are tanned for just this severe service test. Compare results with any make-shift or other material and we are sure General Leathers will prove perfect for the job.

Let the General Leather Company quote you prices on the seat covering for your new Buses, Electric Cars and Taxi-Cabs. The line contains a large variety of colors that stay fast, and grains that are pliable and soft to the touch. On quantity orders we can cut directly from your patterns thus eliminating waste.

Our Specialties which we Recommend for this Purpose:

Majestic Full Grain Leathers
20th Century Spanish Leathers
Genleaco Leathers
Salon Hand Buffed Leathers

America's Largest Producers

GENERAL LEATHER COMPANY

Makers of Famous Tried and Proven "00" Leathers

NEWARK, N. J.

Detroit Office: General Leather Co., 414 Fisher Bldg.
West Coast Office: A. J. & J. R. Cook, Inc., 237 Eighth St., San Francisco.

London Office: R. & A. Kohnstamm, Ltd., 21 West Smithfield, London, E. C.

Canadian Office: Colonial Traders Ltd., 277 Williams St., Chatham, Ont.

"STANDARD" WHEELS

"STANDARD" wrought steel wheels promote that dependable service which inspires and holds public confidence!

That is why more and more electric roads are standardizing on

"STANDARD" WHEELS

STANDARD STEEL WORKS COMPANY

General Offices and Works: Burnham, Pa.

Products

Steel Axles Steel Springs Armature Shafts Rolled Steel Wheels

SALES OFFICES

New York Chicago St. Louis Richmond Portland San Francisco Philadelphia

Put Your Cars on Timkens— Then Tell the Public

JUST as great transcontinental railroad systems have found in "Timken Bearing Equipped" a sure way to increase passenger patronage, so progressive street railway companies are securing similar desirable results by the same method.

Put your existing and new car equipment on Timken Bearings, then tell the public within your operating area all about it.

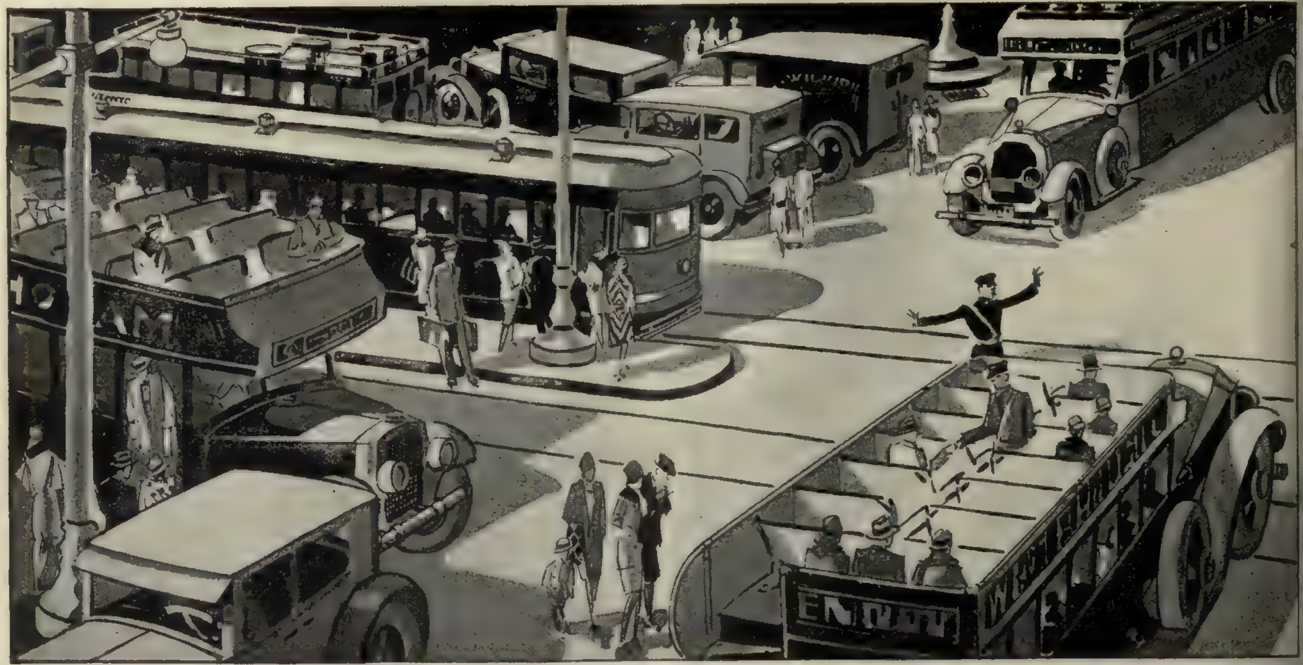
Tell them what this progressive step means in faster, more convenient travel, and prove it with revised running schedules.

Point out the greater riding comfort that comes from the glass-like smoothness of running and the freedom from jerks and jars in starting and stopping as a result of the frictionless performance of your modern Timken Bearing Equipped cars.

The public will respond to your enterprise and leadership as they never fail to respond when shown such consideration for their welfare.

And as your car-hour loads increase, watch your car-mile costs decrease . . . for Timken Bearings will substantially reduce power consumption, save lubricant, and slash maintenance expense to the bone through a combination that not only eliminates friction, but carries all loads—radial, thrust or both together, at the same time . . . the exclusive combination of Timken tapered construction, Timken positively aligned rolls and Timken-made steel. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN
Tapered
ROLLER BEARINGS



ROEBLING

Electrical Wires & Cables

Uninterrupted and economical transportation service depends upon continuous and efficient operation. These results are assured through the use of Roebling Electrical Wire Products of proven quality, among which are—

- Rubber Insulated Wires and Cables
- Paper Insulated Wires and Cables
- Railway Signal Wires and Cables
- Varnished Cambric Insulated Wires and Cables
- Magnet Wire—Silk or Cotton Insulated
- Armature and Enameled Field Coils
- Solenoids for Control Apparatus
- Automotive Wires and Cables
- Welding Cable, Trailing and Electrode Holder
- Welding Wire

John A. Roebling's Sons Company
Trenton New Jersey

Makers of Wire Rope, Wire and Electrical Wires and Cables

The SAFETY CAR ▲ ▲ ▲ CONTROL EQUIPMENT

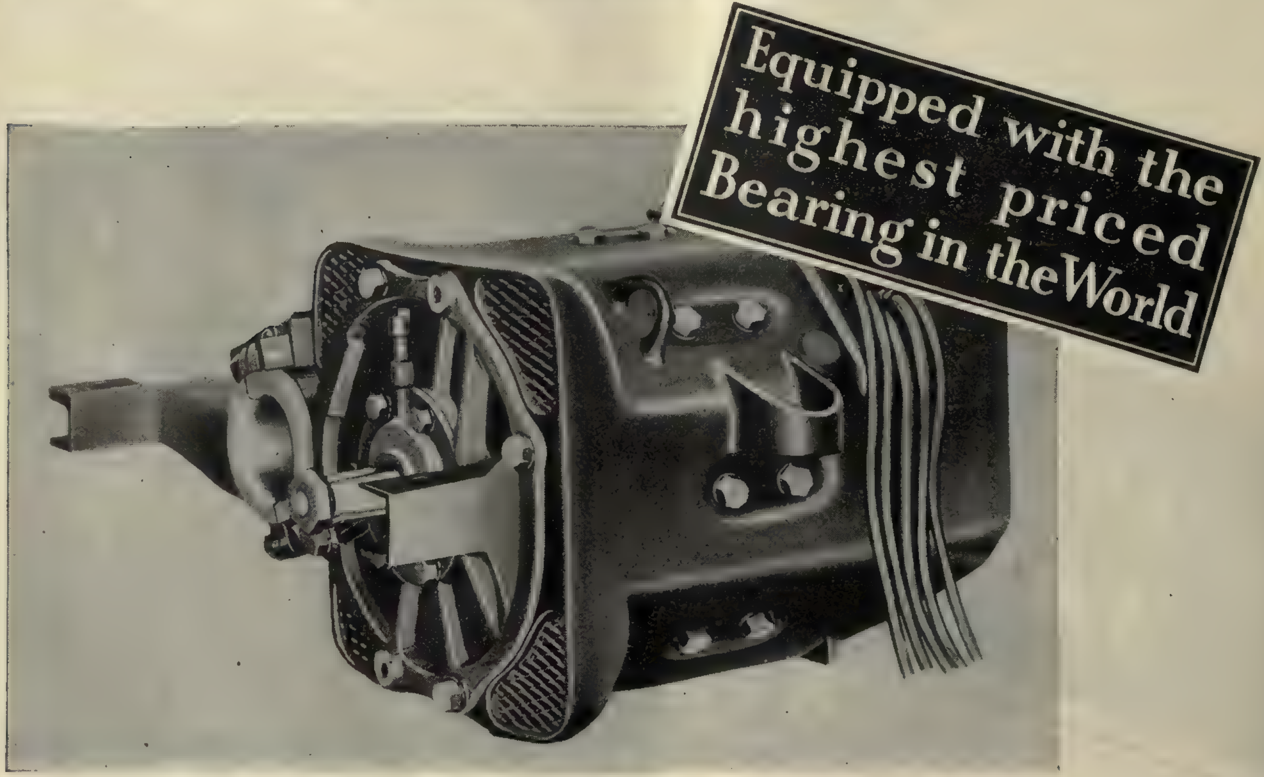
▲ ▲ Promotes Profitable Service

BETTER and faster service with Safety Cars brings in more gross revenue . . . Economy is realized by centralizing operating responsibility in one man whose duties are safeguarded by devices that interlock car control, door operation, and brake manipulation . . . Since operating cost deductions are less, a greater net revenue remains.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH

ANOTHER MANUFACTURER IN THE ELECTRICAL INDUSTRY THAT USES SKF BEARINGS

GENERAL ELECTRIC COMPANY



RAILWAY MOTORS TOO, RUN BETTER WITH LOWER OPERATING COSTS ON SKF

STREET railway motors also play an important part in modernization programs. They must do a two-fold service. ...maintain a high degree of efficiency plus the lowering of operating costs without sacrifice of dependability. SKF Spherical Bearings are a vital necessity in fully meeting these basic requirements. And it is because of this that they are standard for the armature shaft of the G. E. 258 K street railway motor.

Years of actual operation have shown SKF Spherical Bearings are instrumental in keeping cars in service instead of laid up in shops for electrical repairs due to bearing trouble. SKF have the stamina for heavy and continuous service. Wear is negligible and adjustments are never required. This means air gaps are maintained and there is no danger of damage to windings or pole pieces. Gear life is also increased. With sealed housings excluding dirt and moisture and keeping lubricant in for months at a time maintenance is materially reduced.

SKF INDUSTRIES, INC., 40 East 34th Street, New York, N. Y.

2556

EQUIPPED WITH THE HIGHEST PRICED BEARING IN THE WORLD

Means just this

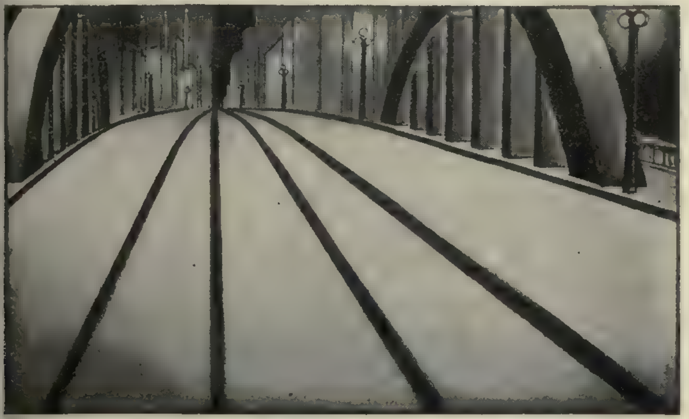
SKF

Ball and Roller Bearings

That the manufacturers whose product is illustrated above preferred to pay more for their bearings and less for servicing or replacing them. They preferred to pay a higher price in the beginning than many times this higher price in the end. And, finally, they preferred to economize by using SKF bearings because they are made to do their job, not to fit a price list.

They selected

CARNEGIE STEEL TIES



.. and insured smooth riding for their patrons

THE BEST MEANS a traction company can employ to overcome automobile competition is to provide a comfortable, uninterrupted ride. Attractive car service removes the incentive for the motorist to provide his own transportation—especially in view of the ever-increasing difficulties of parking. Riding comfort begins with the track. Carnegie Steel Cross Ties provide the foundation for a smooth, repair-free track—a track that saves wear and tear on rolling equipment and greatly enhances its comfort—a track providing long, continuous service. Carnegie Steel Cross Ties will prove a profitable investment—particularly from the standpoint of passenger satisfaction. New booklet on request.

CARNEGIE
STEEL COMPANY
Subsidiary of United States Steel Corporation
PITTSBURGH, PA.

80

**perhaps the greatest advantage of* "Paper Fares"

includes both speed and control—

Speed! Control! Economy!

There you have the three "Musts"—the three necessaries in efficient fare collecting.

Economy sums up the three. There can be no economy if speed is lacking—delays are costly. There can be no economy if fares slip through someone's fingers through lack of control.

Economy comes with a form and design difficult to counterfeit; a form whose significance is taken in with one rapid glance; a design which tells the collector three essential things—time—route—and destination. That is control—economy.

Economy means the ability to check accurately and quickly each fare collected, making it virtually impossible to misuse privileges. The elimination of change-making is time-economy.

The speed with which paper fares are verified and collected, and the resulting speed in moving traffic is a large factor in economy. Properly designed tickets and transfers give you these advantages. Globe has been "properly designing" them for over half a century.

Globe

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New York
Los Angeles
Atlanta

Sales Offices:
Baltimore
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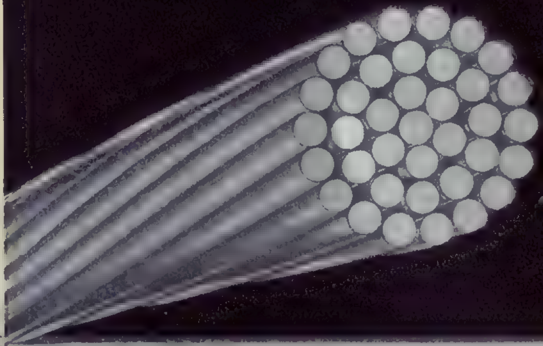


ALCOA ALUMINUM

Make your Feeder Line reliable and it can bring you added profits , , , ,

Use Alcoa All-Aluminum Feeder Cable and A.C.S.R. transmission line conductor, and join the many street railway companies who are giving electric service to small communities along their lines. Using both these cables, insures the lowest possible cost—brings you the one paramount feature necessary—*reliability*. With them you reduce "out of service periods" to a minimum.

Alcoa All-Aluminum Feeder Cable combines all the necessary strength with extremely light weight and high corrosion resistance. All-Aluminum Feeders stay up. The one shown here was erected in 1909. It has given 21 years of sterling service. Alcoa All-Aluminum Cables not only stay up, they are far cheaper to put up. Unit for unit this cable is cheaper to use and erect, because for the same electrical conductance the required weight of aluminum is only half that of any other metal commonly used. A.C.S.R. combines these advantages with the reliability of a high grade steel core.

Let us send you particulars both about All-Aluminum Cables and A.C.S.R.—Aluminum Cable Steel Reinforced. ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM

ALL-ALUMINUM CABLE FOR FEEDER LINES

Philadelphia Rapid Transit banked the money that these Bus Bars saved them

You too, buy bus bars by weight. You too, can save money by buying Alcoa Aluminum Bus Bars—the bars that are over 50% lighter than busses made of any other metal commonly used.

Rigid—pounds lighter per running foot—yet providing the same current carrying capacity, the use of Alcoa Aluminum Bus Bars, unit for unit, calls for lighter or fewer supporting structures. Alcoa Aluminum busses can be furnished in straight lengths up to 90 feet. These lengths bring economy in erection.

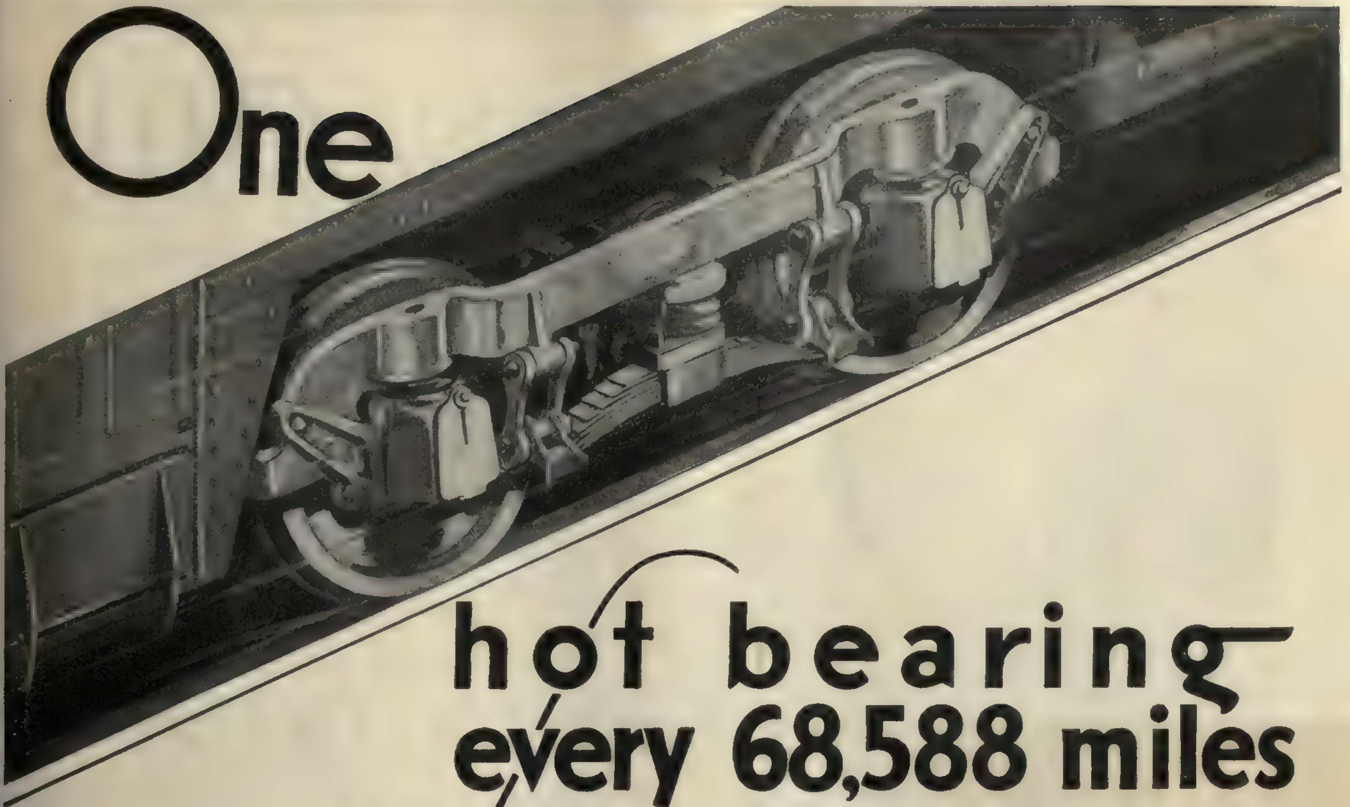
Other advantages of Alcoa Aluminum Bus Bars lie in the fact that the work of bending and assembling is accomplished with ease. The bars also have a lower operating temperature than other busses for the same current capacity.

Tables of weights, carrying capacities and other technical data are contained in the booklet, "Aluminum Bus Bars". May we send you a copy?

ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

BUS BARS MADE OF
ALCOA ALUMINUM

One



hot bearing every 68,588 miles

Lubrication cost 22¢ per M miles

When an Indiana City and Suburban Electric Railway recently made a check of their operating costs over the past five years they discovered lubrication facts that will interest all Electric Railway officials.

During the five year period this company's cars traveled 8,847,838 miles. There were but a total of 129 hot bearings throughout this entire mileage . . . one hot bearing for each 65,588 miles. The cost of car journal oil averaged 12.5 cents per thousand miles. Compressor oil costs amounted to 3.9 cents per thousand miles. Gear grease costs were 5.6 cents per thousand miles. The total lubrication costs were 22 cents per thousand miles.

It is not only the low cost of lubrication that makes this survey interesting but likewise the infrequency of bearing troubles, the savings in waste and babbit metal, and the reduction in power costs. When lubrication costs are computed on this basis, the true value of S.O.C.I. Lubricants is apparent. Car Journal Oils, Gear Greases and Compressor Oils which we have developed for electric railway service will keep your lubrication costs low, just as they have for other companies.

Prove this to yourself, make a six months' test in your equipment. If you will communicate with our nearest office one of our lubrication engineers will be glad to call on you and assist you in planning such a test.

Hear the Chicago Symphony Orchestra every Sunday at 2 p. m., Central Standard Time, over the following stations:

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WWJ	Detroit
WTMJ	Milwaukee
KSD	St. Louis
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WHO	Des Moines
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KSTP	St. Paul-Minneapolis
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205-A

LUBRICANTS FOR ALL INDUSTRY

YOUNGSTOWN, OHIO

POINTS TO THESE TANGIBLE ACHIEVEMENTS OF THE YOUNGSTOWN MUNICIPAL RAILWAY COMPANY AS FACTORS ATTRACTING THE COMMUNITY SUPPORT AND PATRONAGE NECESSARY TO SUCCESSFUL TRANSPORTATION SERVICE . . . ACHIEVEMENTS DEEMED WORTHY OF THE

Charles A. Coffin Award

Development of standards of service — embracing facilities, operating practices and personnel — resulting in holding and gaining revenue passengers.

Acquisition of new cars and busses embodying recent practical developments in street car and bus design.

Modernization of existing plant and equipment to meet competitive requirements of present-day transportation.

Complete coordination of car and bus services.

Promotion of safety program resulting in steady reduction of accidents year by year.

Preparation and passage of model franchise arrangement.

. . . all vindicated in steadily increasing net revenue.

The
PENN-OHIO SYSTEM

Of which the Youngstown Municipal Railway is the chief transportation unit is the only utility organization winning both the Charles A. Coffin Gold Medal (1926) and the Anthony N. Brady Gold Medal (1927).

THE
YOUNGSTOWN MUNICIPAL RAILWAY CO.

Union Metal Helps Build the City Beautiful

Heavily loaded Union Metal Poles, 30 and 32 feet in height, serve Middletown, Conn.

WITH the development of the fluted steel pole, Union Metal made a distinct contribution to the City Beautiful movement. Tall and stately, these fluted poles stand along the curb-line in perfect alignment . . . adding to the beauty of the thoroughfare. They represent the most modern method of carrying overhead wires through city streets. Naturally, their acceptance was immediate.

So strong are these poles that they easily support trolley span wires, feeder lines, distribution wires and street lighting equipment . . . thereby eliminating the necessity for several sets of poles and providing real pole economy for the utilities.

Because Union Metal Heavy Duty Poles are attractive they build good will for their owners wherever they are installed.

We would like to tell you of the many interesting applications and installations of Union Metal Poles. Write the nearest representative for information.

THE UNION METAL MANUFACTURING COMPANY
GENERAL OFFICES AND FACTORY ◆ CANTON, OHIO
SALES OFFICES: New York, Chicago, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

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UNION METAL DISTRIBUTION POLES

Today scientific methods are being applied to the problem of eliminating excessive noise. Here you see technical observers in the streets of New York recording noise levels for a public commission that is striving to abate this nuisance.

The PUBLIC is taking NOISE seriously

This simple test shows how NOISE can be absorbed on your Buses, with J-M Insulation

COMFORT for your passengers means increased patronage for your line. Quiet operation is an important contribution to riding comfort. Excessive noise must be eliminated. J-M Insulation can help you. Applied to the bus body it reduces motor and road noises before they reach the ears of your passengers.

Its effectiveness can be demonstrated by a simple test as shown above. A sheet of metal (such as used in bus body construction) struck with a hammer makes a clanging, ear-splitting noise. The same sheet of metal with a strip of J-M Insulation glued to it, hit in the same way, merely makes a dull thud. That is an indication of what J-M Insulation can do for you.

J-M Insulation is a low-cost answer to the noise problem. And in addition it will increase riding comfort in the summer-time by keeping the inside of the bus cool.

One of the largest bus companies in the East has specified J-M Insulation in over 150 new buses. The "hammer" test mentioned above as well as tests under actual operating conditions convinced this company of the big difference J-M Insulation can make in passenger comfort. Why not let us make these tests for you?

COOLER IN SUMMER

J-M Insulation will make your buses much more comfortable to ride in, in the summer-time. The uncomfortable effects of heat radiation through the roof are eliminated by this material.

Address JOHNS-MANVILLE
At nearest office listed below
New York Chicago Cleveland
San Francisco New Orleans Montreal
(Offices in all large cities)
Please let me have complete information on the use of J-M Insulation in Motor Buses.

Name..
TS-115-7
Address......................................

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville
SERVICE TO TRANSPORTATION

Tile Flooring, Transite, Packings, Asbestos Shingles, Fibre Conduit, Masticoke & Truss-Plate Flooring, Asbestos Exhaust Pipe Covering, Bus & Car Insulation, Brake Blocks and Linings, Built-up and Ready-to-lay Roofing, Electrical Insulating Materials, Refractory & Insulating Cements, Friction Tape.

Illustration: The SIXTH STREET BRIDGE over Allegheny River at Pittsburgh, Pa., selected by a national jury appointed by AMERICAN INSTITUTE OF STEEL CONSTRUCTION as the most beautiful bridge completed in 1928.

The STRUCTURAL STEEL in the superstructure of this bridge was produced by Carnegie Steel Company, and FABRICATED and ERECTED by

AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

General Offices: 71 Broadway, New York, N. Y.

Contracting offices in New York, Boston, Philadelphia, Baltimore, Pittsburgh, Cincinnati, Cleveland, Detroit, Chicago, St. Louis, Minneapolis, Duluth, Salt Lake City and Denver.

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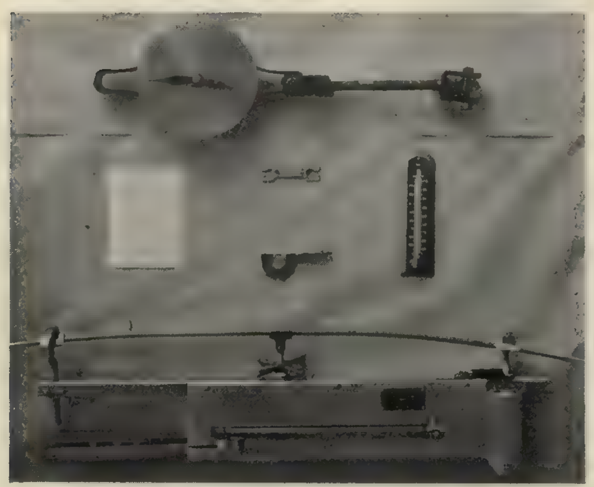
Cleveland Dynamometer Tests Show Phono-Electric Wire Superior in Elastic Limits, Breaking Strength, and Wear



Types of dynamometers and wire measuring devices used by the Line Division of The Cleveland Railway Company.

All trolley wire on the Cleveland Railway is strung with the use of a dynamometer. Under climatic conditions in that city it has been found very satisfactory to use this method, and the appearance of the overhead indicates that the tensions obtained are very uniform.

One important point to observe in stringing wire is to have a tension sufficient to provide a good running surface for the trolley wheel, and yet not to exceed the elastic limit of the wire even in the most severe weather likely to be encountered in winter. A table has been worked out for copper and for Phono-Electric wire, calculated for 85 deg. from 30 deg. F. to 90 deg. and for 10, 20 and 100 deg., giving the calculated tension to which the trolley wire must be drawn when it is erected. Here the elastic limit of Phono-Electric is higher than copper. High-strength Phono-Electric wire, it will be noted, has a much greater breaking strength and may be allowed to remain in the line until it reaches a considerably smaller diameter than the copper wire, as shown in the second table.

Table II—Relation Between Breaking Strength and Wear for No. 00 Wire, Phono-electric and Copper

Diag.	Vertical diameter of worn wire, mils	Area, sq.in.	Copper		Phono-Electric	
			Breaking strength, lb	Condition	Breaking strength, lb.	Condition
	364.8	0 1046	5,520	New	8,200	New
	300	0 08108	4,280	Good	6,360	Above new copper
	275	0 07214	3,810	Fair	5,650	Still above new copper
	250	0.0633	3,340	Dangerous	4,960	Above good for copper
	200			Renew wire		
	200	0 0466	2,460	Down	3,650	Dangerous
	150	0.0311	1,640	Down	2,435	Must come down

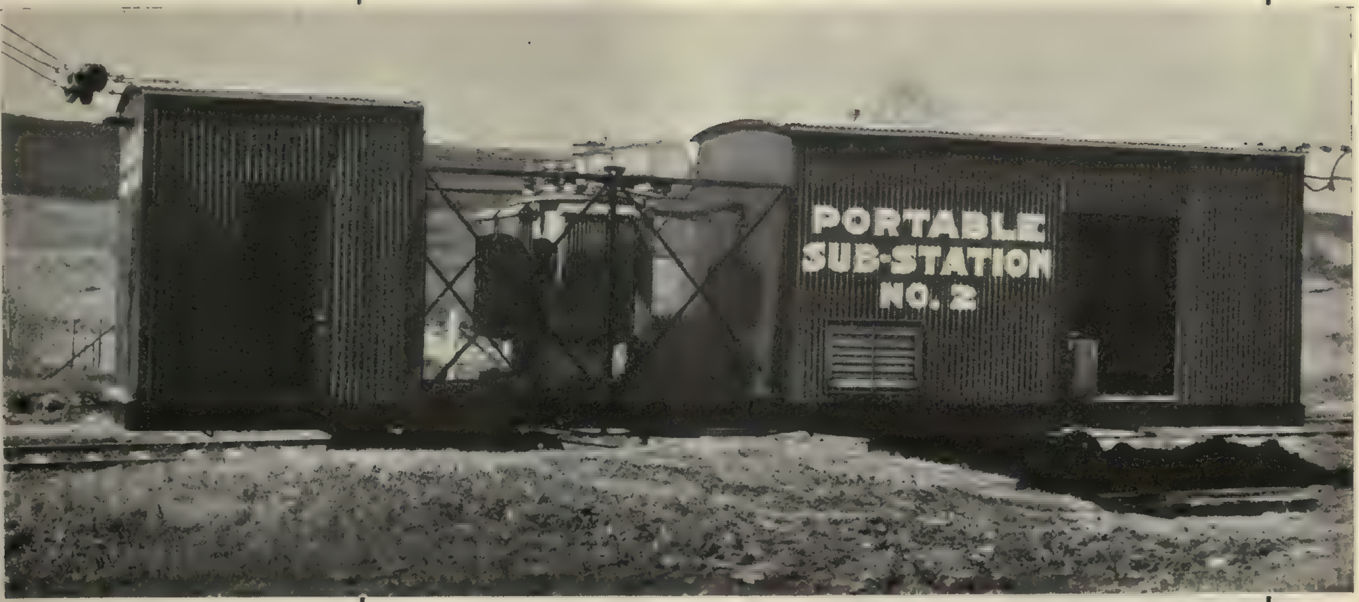
Table I—Trolley Wire Tension to Be Obtained by Use of Dynamometer

Temperature Deg. F.	No. 00 Gage Copper	No. 00 Gage Phono-electric	No. 0000 Gage Copper
10	2,500	2,950	3,900
20	2,350	2,750	3,650
30	2,200	2,550	3,425
35	2,100	2,450	3,325
40	2,000	2,350	3,200
45	1,925	2,250	3,100
50	1,900	2,150	3,000
55	1,825	2,050	2,900
60	1,700	1,950	2,750
65	1,625	1,850	2,550
70	1,550	1,750	2,400
75	1,475	1,700	2,275
80	1,400	1,600	2,100
85	1,325	1,500	2,000
90	1,250	1,400	1,900
100	1,100	1,200	1,625

Phono alloys have proved their merit on nearly every electrified transportation system in the world. It pays to learn the facts. Write to Bridgeport for any further technical data desired.

"Phono-Electric" Bronze Alloy **TROLLEY & SPAN WIRE**

BRIDGEPORT BRASS COMPANY General Offices, East Main St., BRIDGEPORT, CONN.



Consider - - -
the portable rectifier sub-station

A portable rectifier sub-station is a complete rectifier unit, with transformers, circuit-breakers, and all accessories, erected on a flat car—capable of being hauled wherever there are rails and alternating current.

The freedom from vibration caused by rotating machinery means that an ordinary flat car can be used. There is no necessity for bracing or foundation work.

The obvious advantages of the rectifier combined with the known advantages of the portable sub-station suggest the use of this form of equipment in place of portable or permanent converter sub-stations.

We are prepared to quote on entire sub-stations or on any of the equipment which goes into them.

ABB

AMERICAN BROWN BOVERI CO., INC.
CAMDEN, N. J.

AMERICAN BROWN BOVERI

WINNERS

"for excellence in editorial work"

WE ARE PLEASED TO ANNOUNCE THAT

Morris Buck

and

George J. MacMurray

of *Electric Railway Journal's* Editorial Staff have been awarded the A.B.P. ("Associated Business Papers, Inc.") prizes for 1929, as follows:

2nd Prize to Mr. MacMurray in the contest for

> **"BEST EDITORIAL, judged by importance of subject, clearness of style, sound reasoning and power to influence."**
>
> Awarded for "Editorial in February 16, 1929, issue of *Electric Railway Journal,* entitled 'The Subsidy as a New Shibboleth.' "

2nd Prize to Mr. Buck in the contest for

> **"BEST ARTICLE, SERIES OF ARTICLES OR NEWS REPORT, judged broadly on the basis of timeliness, accuracy, thoroughness, originality, clearness of expression and usefulness."**
>
> Awarded for "Series of articles published in *Electric Railway Journal* during the year 1929, entitled 'Result of Industry-Wide Survey of Electric Railways.' "

This is the first time in the history of the Associated Business Papers Awards that any one publication has won two awards in a single year. And in 1927, *Electric Railway Journal* won the first award for having rendered the most outstanding editorial service to its industry, making three awards in all won by *Electric Railway Journal* for editorial excellence during the past three years.

**ELECTRIC RAILWAY
JOURNAL**

"Canned Experience"

Make use of the other man's experience

That old saying about experience being the best teacher is absolutely sound. But most of us recite it without thinking that experience may be of various sorts — the experience of other men as well as our own. "canned experience," if you please, ready for use. Why not take advantage of the experience of other men as far as we can and save not only years of time but many expensive lessons?

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There is no additional charge for books purchased on the budget plan. The prices are the same as for cash.

1

Richey—

Electric Railway Handbook

Second Edition, 798 pages, flexible, pocket size, 528 illustrations, $4.00

A thoroughly revised reference book of practical data, formulas and tables for the use of operators, engineers and students. It gives the essential reference data on all phases of electric railway construction and operation. It presents: (1) Data on subjects which come up in everyday electric railway practice. (2) Material of service to the non-technical manager or operator. (3) Reference material on electric railway practice for those who are specializing in other or allied lines.

2

Harding—

Electric Railway Engineering

Third Edition, 480 pages, 6x9, 248 illustrations, $5.00

A thorough revision of this standard work on the theory and practice of electric railway engineering. The book covers the principles of train operation, power generation and distribution, equipment and types of systems.

3

Kurtz—

Lineman's Handbook

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The first book written expressly for linemen, foremen, and other employees of line departments. The book meets the growing need for a pocket volume of construction and maintenance data, procedure, and methods. It presents hundreds of kinks, shortcuts, expedients and time- and work-saving methods, as well as scores of useful diagrams, tables, and formulas for the lineman.

4

Standard Handbook for Electrical Engineers

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A widely-known encyclopedia of electrical engineering. The book covers every branch of modern electrical engineering. It is complete and reliable, and so carefully and fully indexed that its information is readily accessible.

5

Croft—

American Electricians' Handbook

823 pages, pocket size, 900 illustrations, flexible, $4.00

The book is a reliable, useful handbook for wiremen, contractors, linemen, plant superintendents and construction engineers. It aims to give the practical man the facts on apparatus, materials and installation which he needs in his daily work. It is practical from cover to cover.

6

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A second edition of this widely known book on the transportation side of the electric railway business — getting the cars over the tracks — increasing the traffic — collecting the fares — and selling service in the face of modern conditions. Particular consideration is given to the place of the bus in modern transportation.

7

King—

Railway Signaling

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A completely adequate book on all phases of modern railway signaling. The book describes fully the construction, installation, operation and maintenance of signaling equipment, and presents a thorough discussion of principles.

8

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This book presents the essential facts and the most mature views upon the underlying financial and economic phases of public utility companies with particular emphasis on electric railways, electric light and power companies and gas companies.

It discusses every angle of the public utility *as a business* and treats thoroughly such subjects as capitalization, investment features, franchises, regulation, valuation, depreciation, taxes, rates, service, accounting methods, public relations, etc.

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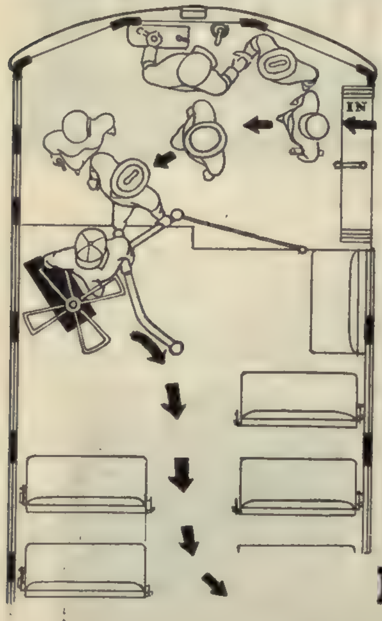


Either old style or modern cars can be equipped successfully with Perey Street Car Coinpassors. Complete details promptly on request—with no obligation whatever on your part.

PEREY STREET CAR COINPASSORS

Increase Your Revenue *without increasing fares*

Increased income follows the installation of Perey Street Car Coinpassors because every fare is collected and registered—every rider pays. This simple mechanical method of collecting fares, which also assures quicker loading and faster running time, is the final step to complete car modernization.

Severe tests under operating conditions have demonstrated conclusively the following advantages in the use of Perey Street Car Coinpassors on one-man cars:

1. Makes one-man operation practical on cars of every type and size and under most congested traffic conditions.
2. One operator can handle larger crowds without delay.
3. No rider can evade fare by slipping past the operator.
4. Relieves operator of responsibilities for collection and registration of fares. He has only to make change and issue transfers, when necessary.
5. Front, center or rear exit can be used with treadle operator.
6. Utilizes available platform space effectively. Platform entrance can be as large as desired.
7. Fast as the movement of passengers.
8. Speeds schedules.

PEREY TURNSTILE CO.

101 Park Avenue, New York City

TOLEDO TORCH

Guides traffic—protects work and workmen. Self-righting, unbreakable, stormproof. Only the Toledo has the Efficient Economy Burner. Ask your dealer or write us for prices.

TPS The Toledo Pressed Steel Co.
TOLEDO OHIO
Save with Steel

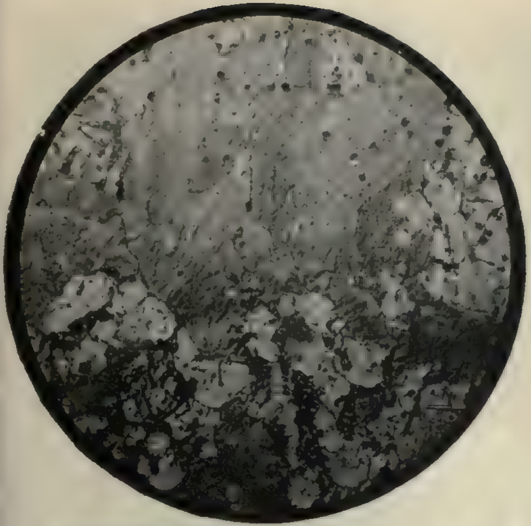
Manufacturers of the Toledo Horse—the ideal barricade.

TUCOLITH FLEXOLITH

THE FLOORING THAT HAS MET WITH GENERAL APPROVAL IN THE

ELECTRIC RAILWAY FIELD

TUCO PRODUCTS CORP.
30 CHURCH ST., NEW YORK
Peoples Gas Bldg.,
122 South Michigan Ave., CHICAGO



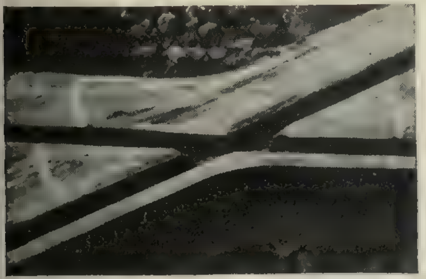
Photomicrograph of a TIMANG weld deposited on 14% manganese steel casting—illustrating the density, penetration and homogenous structure of TIMANG Welding Rod.

A REVELATION *in* WELDING MANGANESE STEEL . . . .

TIMANG

MANGANESE STEEL WELDING ROD (Uncoated)

When this crossing on a main line failed it was quickly welded with TIMANG and kept in service on this line for four months, and then removed to another piece of track.



Here is the same crossing, welded with TIMANG, after being in service four months. The crossing is still in service, in excellent condition.

THE photomicrograph illustrated, stamps out the age-old theory that manganese track work can not be satisfactorily welded.

Compare the structure of the TIMANG weld with that of the parent metal.

Both have practically the same manganese content—Brinell Hardness—and general service requirements.

The TIMANG Manganese Rod was developed in the TISCO laboratories—and for two years has been tested, and proven, by many leading roads, for all manganese welding requirements.

Patent No. 1,732,202

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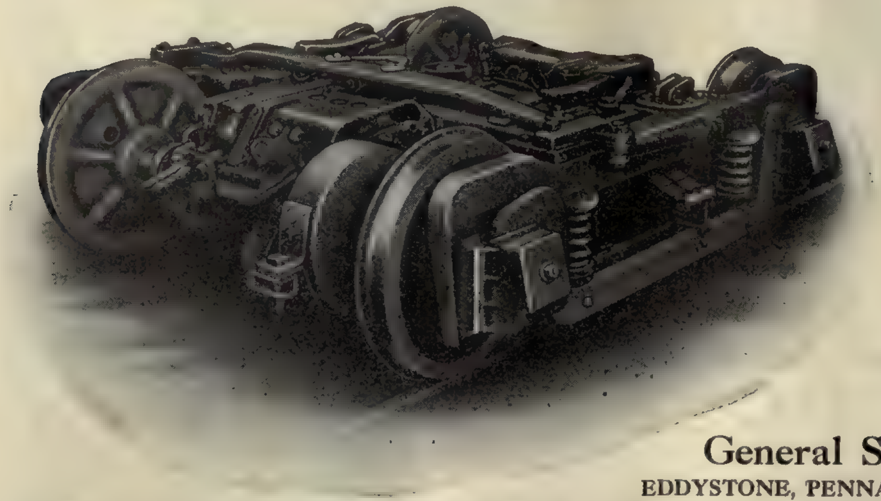

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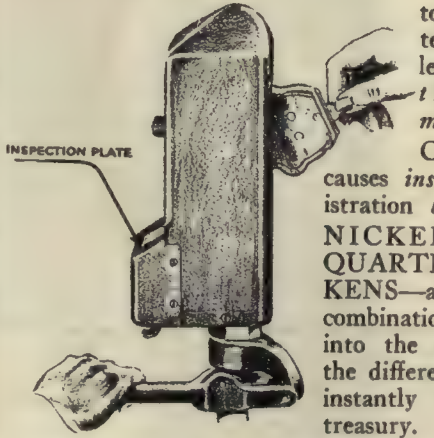

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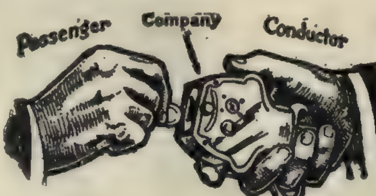

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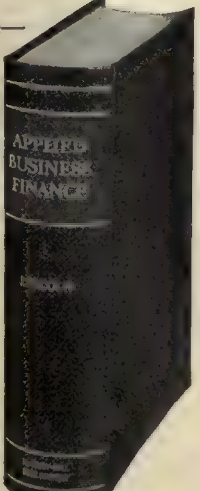

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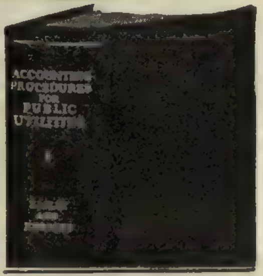

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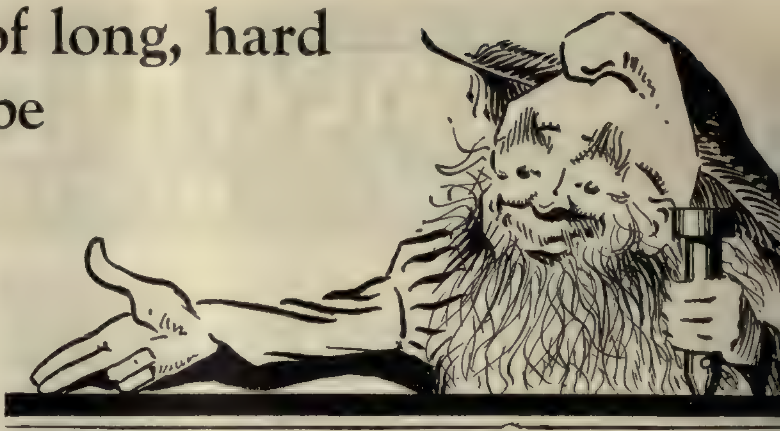

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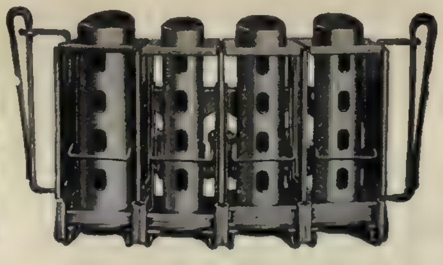

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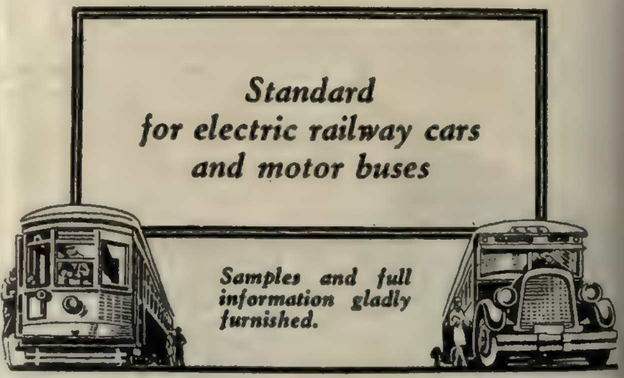

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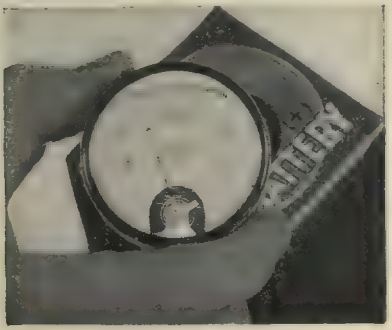

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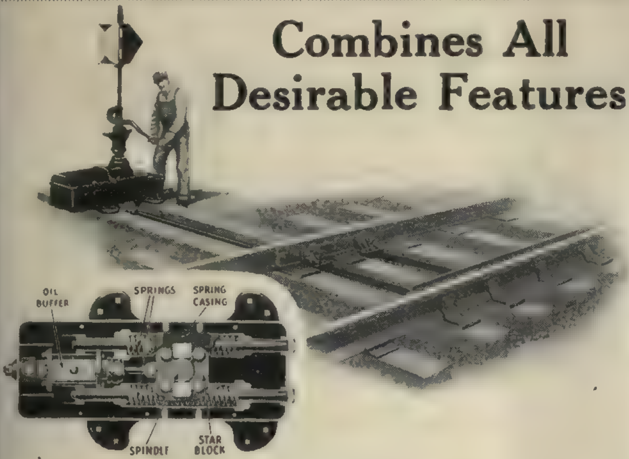

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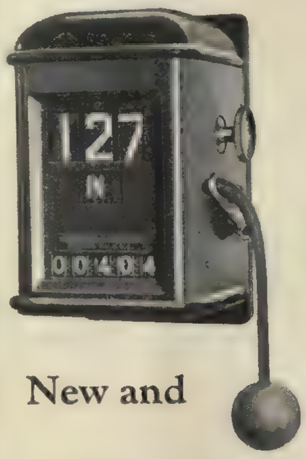
Hillburn, New York. Niagara Falls, N.Y. Chicago, Illinois. East St Louis, Ill. Superior, Wis. Pueblo, Col Los Angeles, Cal. Seattle, Wash Niagara Falls, Ont.

The New INTERNATIONAL

R 13 Bus and Car Register



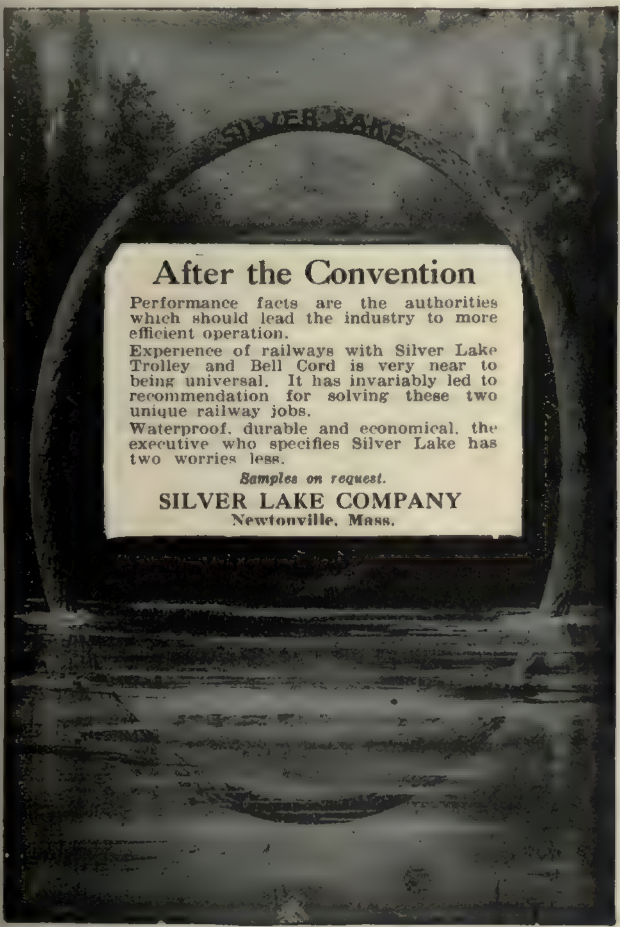
The result of forty years of fare register experience

New and Exclusive Features

Light Weight
Low Cost
Long Life
Positive Gear Drive
Indestructible Parts

Write for New Catalog

The International Register Co.
15 South Throop St., Chicago


SILVER LAKE

After the Convention

Performance facts are the authorities which should lead the industry to more efficient operation.

Experience of railways with Silver Lake Trolley and Bell Cord is very near to being universal. It has invariably led to recommendation for solving these two unique railway jobs.

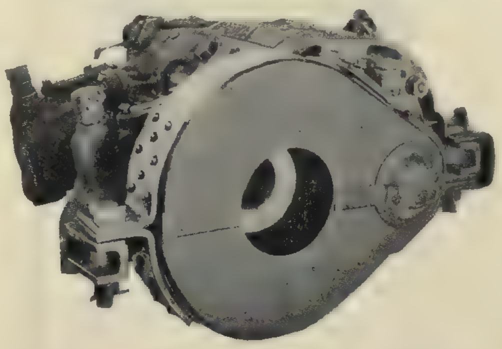
Waterproof, durable and economical, the executive who specifies Silver Lake has two worries less.

Samples on request.

SILVER LAKE COMPANY
Newtonville, Mass.

Chillingworth

One-Piece Gear Cases



Seamless, Rivetless, Light in Weight

Chillingworth One-Piece Gear Cases will wear longer because they are made of tough durable deep drawing steel, properly annealed and supported by strong Malleable Iron Brackets, or Forged Steel if you prefer. They meet all operating requirements. Used extensively on rapid transit service.

Most steam road electrifications use Chillingworth Cases.

Chillingworth Manufacturing Co.
Jersey City, N. J.

REPRESENTATIVES

CANADA
Railway & Power Eng. Co.
ENGLAND
Tool Steel Gearing & Equip. Co.

NEW YORK
J. W. Gerke
FRANCE
A. P. Champion

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or SPECIAL

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch	$6.00
2 to 3 inches	5.75 an inch
4 to 7 inches	5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. R.J.

COPY FOR NEW ADVERTISEMENTS ACCEPTED UNTIL 3 P. M. ON THE 20TH FOR THE ISSUE OUT THE FIRST OF THE FOLLOWING MONTH

POSITIONS WANTED

ARMATURE winder well experienced with railway equipment desires change. Reference. PW-217, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

ENGINEER: Twenty years' experience with large eastern company as superintendent M. of W. and division manager would like to make change. PW-216, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MR. MANAGER: In capacity of superintendent transportation with several companies, my efforts resulted in increased revenue, decreased costs, better public relations. That which I have accomplished for others, I can do for you. Twenty years' experience. Highest references. Correspondence invited. PW-219, Electric Railway Journal, Tenth Ave. at 36th St., New York.

REPRESENTATIVE WANTED

Sales Representative

For Metropolitan District, calling upon Bus & Electric Car Operators. RW-218, Electric Railway Journal, Tenth Ave. at 36th St., New York.

WANTED

Railway-Equipment
Power Plants
Rails and Overhead

Be sure to get our bid.
Dismantling done by us.

The Allite Corporation
636-38 Broadway, New York

FOR SALE
1000 K.W.
SYNCH. MOTOR GEN. SET

Modern type Westinghouse 575 v. D.C., 3 ph., 60 cy., 2,200 v., .8 P.F., A.C. 900 r.p.m. Motor Generator Set with Dir. Conn. Exciter and complete A.C. and D.C. Switchboards. Condition 95% New.

JOHN D. CRAWBUCK COMPANY
Empire Bldg., Pittsburgh, Pa.

FOR SALE

Passenger Cars—Freight Motors

12—All Steel Cars
1—All Steel Freight Motor
2—Semi-Steel Freight Motors

All have Baldwin Trucks, H. L. Control
W. 333 Motors, Straight and Automatic Air

All in First Class Condition.

Cars recently painted and equipped for train operation. Seating capacity 59.

Attractive Prices for Quick Sale

THE JOSEPH SCHONTHAL COMPANY
COLUMBUS, OHIO

Bargains in Buses

In an effort to standardize on a few makes we have on hand a number of very desirable buses for quick disposal. These buses include Fageol sixes in excellent mechanical condition and good for many, many more miles of dependable service. Many of these buses have been rebuilt with raised roofs, inside baggage racks and reclining chairs. There are also some A.C.F.s both with and without inside baggage racks, Internationals, Reos, Studebakers, etc. All buses have weathertight bodies and are in first class mechanical condition. Write or wire for specifications and prices. Address

P. C. JOHNSON
GREYHOUND Lines
34th Place and Cottage Grove
Douglass 5100 Chicago, Illinois

Don't Say, *"It's not worth anything"*

THAT surplus Railway Equipment you consider of no value can be turned into cash! The fact that it's of no further value to you doesn't mean that it is not of value to somebody else. There's always a market for used railway equipment. Reach the greatest number of prospective buyers for the surplus Railway Equipment you have at a minimum cost, thru an advertisement in the—

SEARCHLIGHT SECTION

Your Best Market
for
Old Trolley Cars and Equipment

Reliable Service

L. SCHIAVONE & BONOMO BROS., Inc.

Jersey City New Jersey

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire railroads and street railways. Also industrial and public service properties which have ceased operation. We furnish expert appraisals on all such properties.

May We Serve You?

The Perry, Buxton, Doane Company

(Capital $1,000,000.00)

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.

Pacific Sales Office—Failing Building, Portland, Oregon

600-Kw. 60-Cycle Sub-Station

1—Complete 600 kw. 60 cycle Railway Sub-Station, consisting of—

- 2—300 kw. Westinghouse compound interpole rotator converters, 600 volts direct current, 6 phase 60 cycle alternating current, 1,200 r.p.m.
- 6—100 kva. Westinghouse single phase transformers, 13,200 volts primary.

Complete with direct and alternating current switchboard equipment as in operation.

Excellent condition. On original foundation. Must move immediately.

Will quote attractive price for quick sale.

THE NATIONAL POWER MACHINERY COMPANY
1914-1918 Scranton Road, Cleveland, Ohio

FOR SALE

TURBO GENERATOR

Westinghouse, 1250 kva., 2300 volt, 3600 r.p.m., 2 phase, 60 cycle with turbine and condenser. LOCATION—Canton, Ill.

ENGINE GENERATORS

Westinghouse, 2300 volt, 3 phase, 60 cycle with Rice & Sargent and Chuse engines. LOCATION—Mattoon, Ill.

TURBO GENERATOR

General Electric, 2300 volt, 3 phase, 60 cycle with Terry turbine and Worthington condenser. LOCATION—Paris, Ill.

N. C. STIREWALT, *Purchasing Agent*
Central Illinois Public Service Company
Public Service Bldg., Springfield, Ill.

FOR SALE

6—Light Weight Double Truck Passenger Cars

Two to four years old—weight 30,000 lbs.—excellent condition—ready for immediate shipment.

Priced for quick sale.

"We buy Railways in their entirety."

H. E. SALZBERG CO.
225 Broadway, New York City

There is always a market for used railway equipment, somewhere. Don't make the mistake of junking it—advertise and turn it into CASH

HIGHEST PRICES PAID FOR ELECTRIC RAILWAYS FOR—

DISMANTLING

M. K. FRANK
Clark Building,
Pittsburgh, Pa.
220 E. 42d Street,
New York,
N. Y.

Cleaning that pays dividends

TRACTION companies find that it pays to keep cabs and busses clean and attractive. The returns can be measured not only in increased patronage but also in longer life for equipment.

With a minimum of time and effort, Oakite cleaning freshens paintwork, leaves windows film-free and clear, brightens enamel and metal fixtures, removes muck, dirt, traffic grime and grease from cars and busses, inside and out. Whether cleaning is done at the end of each day's run or at periodical over-hauling, you can be certain that the economies effected will be appreciable.

Ask our nearest Service Man to study your cleaning problems with a view to recommending dollar-saving Oakite methods for their solution. A postal or phone call to us will bring him to your shops. No obligation.

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N.Y.

Oakite Service Men, cleaning specialists, are located at

Albany, N. Y.; Allentown, Pa.; *Atlanta, Baltimore, *Boston, Bridgeport, *Brooklyn, N. Y.; Buffalo, *Camden, N. J.; Charlotte, N. C.; Chattanooga, Tenn.; *Chicago, *Cincinnati, *Cleveland, *Columbus, O.; *Dallas, *Davenport, *Dayton, O.; Decatur, Ill.; *Denver, *Des Moines, *Detroit, Elmira, N. Y.; Erie, Pa.; Flint, Mich.; Fresno, Cal.; *Grand Rapids, Mich.; Harrisburg, Pa.; Hartford, *Houston, Texas; *Indianapolis, Jackson, Mich.; *Jacksonville, Fla.; *Kansas City, Mo.; *Los Angeles, Louisville, Ky.; Madison, Wis.; *Memphis, Tenn.; *Milwaukee, *Minneapolis, *Moline, Ill.; *Montreal, Newark, N. J.; New Haven, *New York, *Oakland, Cal.; *Oklahoma City, Okla.; *Omaha, Neb.; *New Orleans, La.; *Philadelphia, *Pittsburgh, Pleasantville, N. Y.; Portland, Me.; *Portland, Ore.; Providence, Reading, Pa.; Richmond, Va.; *Rochester, N. Y.; Rockford, Ill.; *Rock Island, Sacramento, Cal.; *San Francisco, *Seattle, South Bend, Ind.; Springfield, Mass.; *St. Louis, *St. Paul, Syracuse, N. Y.; *Toledo, *Toronto, Trenton, *Tulsa, Okla.; Utica, N. Y.; Worcester, Mass.; Youngstown, Ohio.

*Stocks of Oakite materials are carried in these cities.

OAKITE
TRADE MARK REG U S PAT OFF
Industrial Cleaning Materials and Methods

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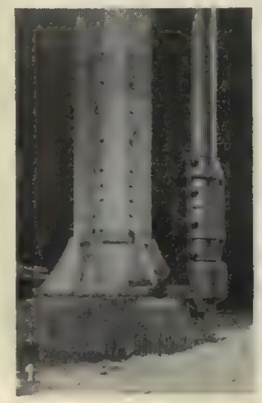
Reinforcing Corroded Poles



A method of reinforcing poles on a bridge, using M.I.F. Reinforcing Clamps, was featured in an article on page 340 of the April issue of Electric Railway Journal—using the above cut and heading.

The Construction Superintendent of this prominent Electric Railway Company says he finds these Reinforcing and Extension Clamps indispensable for emergency and temporary construction work, as well as for routine maintenance.

Every Company using tubular poles should keep an assortment of these Clamps on hand. Savings from their use will soon equal their cost. Fully described in Sales Bulletin No. 3.

Send for a copy.

Also send for literature, with samples, featuring latest type devices aiding in solution of these problems:

Suspension of Signal Wires, Control Cables, etc.—Span Hangers with split porcelain insulators for grouping, or with spool insulators for spacing apart—for services with, or across, the supporting messengers.

Suspension of Lead-Covered or Armored Aerial Cables—Cable Suspension Clamps of various types for all service conditions.

Simplification of Guying—Ingenious labor-saving Guy Hooks, Eye Nuts, Heavy Duty Guy Clamps, etc.

Securing Adjustability in H-Column Construction—Special H-Column Mounts and Adjustable Clamps for cross members eliminating all punching—also Catenary Clamps.

We feature Engineering Service
for special jobs.

MALLEABLE IRON FITTINGS COMPANY
Pole Hardware Department
Factory and New England Sales Office:
Branford, Conn.
MIF **New York Sales Office:** MIF
Thirty Church Street
Canadian Mfg. Distributor:
LINE & CABLE ACCESSORIES, Ltd., Toronto

"Let's go by BUS!"

BENDER Palace Hyway Coach Offers the Comfort that Turns Occasional Riders Into Regular Passengers

1. Spacious, comfortable seats.
2. Full head room.
3. Luggage inside, protected against weather.
4. Cushion-edge luggage racks for passenger safety.
5. Commodious aisle, the widest of any coach of this type for the same over-all width.
6. Sturdy windows that operate easily and raise all the way up.
7. A beautiful, harmonious, restful interior.
8. *Safe*, easy-riding, substantial construction.

Full particulars await your request.

This 33-passenger unit can have an auxiliary seating arrangement, building the total up to 41

THE BENDER BODY CO. W. 62nd and Denison Cleveland, Ohio

BENDER BODIES

CHICAGO Repeats—

Orders six, and then seven

BRILL TROLLEY BUSES

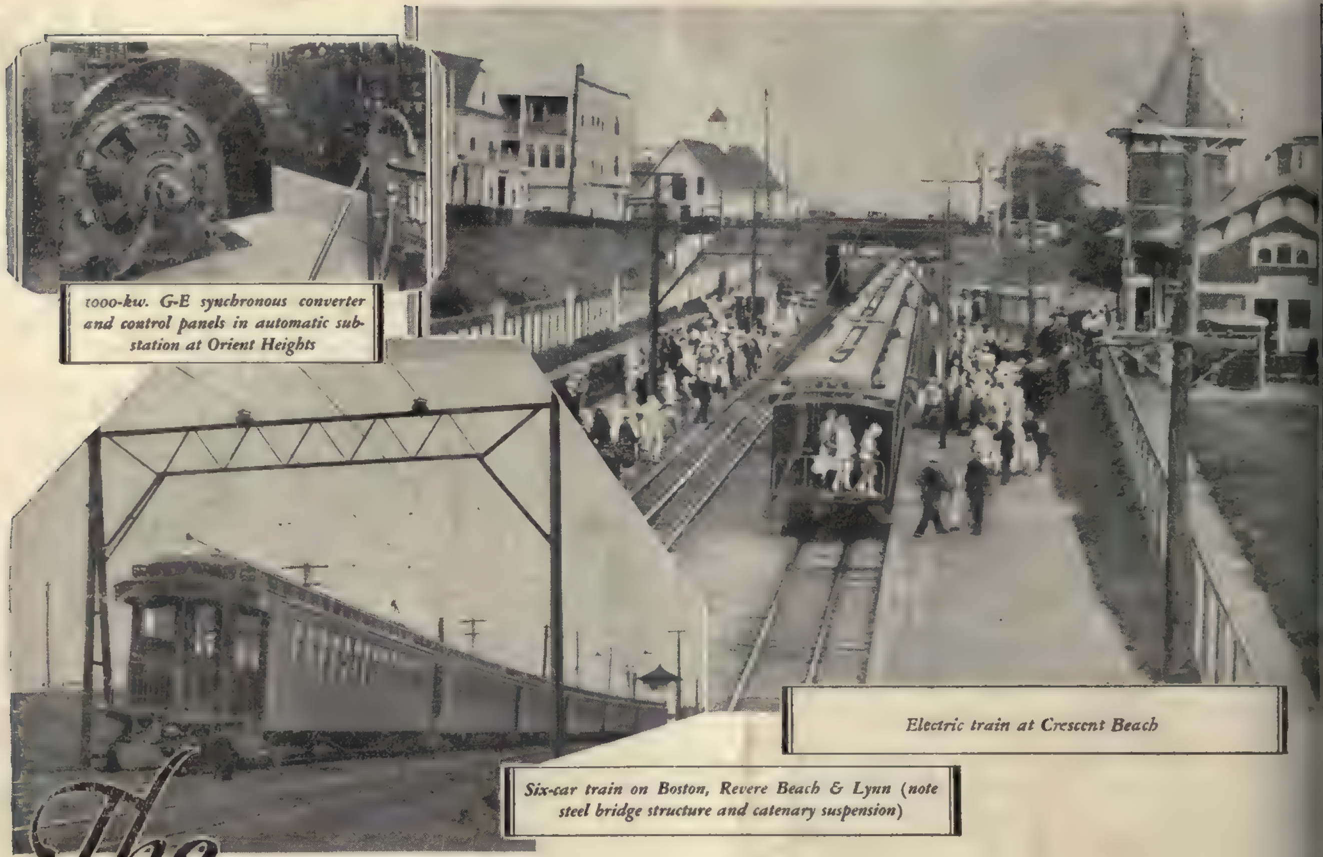
he Chicago Surface Lines recognizes e merit of the trolley bus. Its flexibility i traffic, quick acceleration, smooth eration, unlimited supply of light, eat and power, and the familiarity of isting organizations with its type of equipment are factors worthy of consideration.

The fact that Chicago placed two orders for Brill Trolley Buses, a total of thirteen units, is certainly significant.

THE J. G. BRILL COMPANY
PHILADELPHIA

American Car Company
St. Louis
The G. C. Kuhlman Car Co.
Cleveland

Wason Manufacturing Co.
Springfield, Mass.
Pacific Coast Representative
Rialto Building, San Francisco



1000-kw. G-E synchronous converter and control panels in automatic substation at Orient Heights

Electric train at Crescent Beach

Six-car train on Boston, Revere Beach & Lynn (note steel bridge structure and catenary suspension)

The Boston, Revere Beach & Lynn electrified to improve schedules

THE Boston, Revere Beach & Lynn Railroad, which operates 34½ single-track miles of narrow-gauge track between East Boston and Lynn, Mass., serves a densely populated suburban district and—during the summer months—a heavily patronized seaside resort. It carries nearly 15,000,000 passengers annually.

Of late years, the overwhelming daily demands of commuters and visitors to Revere Beach dictated an increased frequency of service and a material decrease in running time. As the best and most economical way to meet these demands, the railroad, in 1928, installed General Electric traction equipments on its passenger cars.

As many as eight cars can be coupled into one train, all being controlled by a single operator in the leading cab. General Electric also furnished synchronous converters for the substations (one equipped with complete automatic control), a 1000-kw. portable substation, overhead line material, and electric turnstiles.

JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

350-69

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIE

ELECTRIC RAILWAY JOURNAL

TEXAS.

Hill Publishing Company, Inc. AUGUST, 1930 Thirty-five Cents per Copy

KEEP YOUR CARS ON TIME ON TIMKENS

More time for themselves and less time for transportation is the aim of the traveling public, and at no previous period has the clamor for speed reached such proportions.

Electric railways cannot afford to lag behind in the race for public patronage, and progressive companies are operating on faster running schedules . . . schedules in which delays have no place . . . schedules based on modern Timken Bearing Equipped cars.

Lower power, lubrication and maintenance costs and greater riding comfort are other valuable advantages incidental to the exclusive radial-thrust load carrying combination of Timken tapered construction, Timken positively aligned rolls and Timken-made steel.

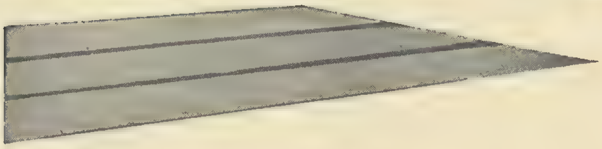
Car builders will gladly cooperate to give you Timken benefits. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN BEARING EQUIPPED

TIMKEN *Tapered Roller* BEARINGS

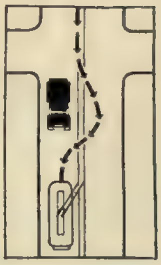
WESTINGHOUSE—A PIONEER AND LEADER IN TROLLEY BUS APPLICATION

Where the track ends~ *service does not stop*



THE Trolley Bus lends itself admirably to trolley line extension. New residental sections are developing in many cities where the traffic may not justify the cost of laying tracks. The Trolley Bus with its lower initial and operating costs and its deluxe service is the solution.

Westinghouse furnishes complete electrical equipment for trolley buses including overhead and current collecting equipment.



Weaving in and out from the curb, dodging slow street traffic, prove the value of the trolley bus in keeping fast, accurate schedules and satisfied patrons.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

WESTINGHOUSE ELECTRIC

T 31430

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

MORRIS BUCK
Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY
JOSEPH R. STAUFFER

JOHN A. MILLER, JR., *Managing Editor*

Vol. 74, No. 9 *Pages 497-554*

PAUL WOOTON
Washington
W. C. HESTON
Pacific Coast Editor
ALEX MCCALLUM
London, England

LOUIS F. STOLL
Publishing Director

Trolley Bus Operation Increasing

NEW installations have recently been made in a number of cities. Everyone is interested in this new transportation vehicle. A series of articles giving details of routes, equipment, operating results, etc., will appear in future issues of the JOURNAL.

McGraw-Hill
Publishing Company,
Inc.

Tenth Avenue at 36th Street
New York. N. Y.

CABLE ADDRESS:
"MACHINIST, N. Y."

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1930

Official correspondent in the United States for Union International de Tramways, de Chemins de fer d'Interêt local et de Transports Publics Automobiles.

NEW YORK, *District Office, 285 Madison Avenue*
WASHINGTON, *National Press Building*
CHICAGO, *520 North Michigan Avenue*
PHILADELPHIA, *1600 Arch Street*
CLEVELAND, *Guardian Building*
BOSTON, *1427 Statler Building*
GREENVILLE, S. C., *1301 Woodside Building*
DETROIT, *2-257 General Motors Building*
ST. LOUIS, *Bell Telephone Building*
SAN FRANCISCO, *883 Mission Street*
LOS ANGELES, *632 Chamber of Commerce Bldg.*
LONDON, *6 Bouverie Street, London, E. C. 4*

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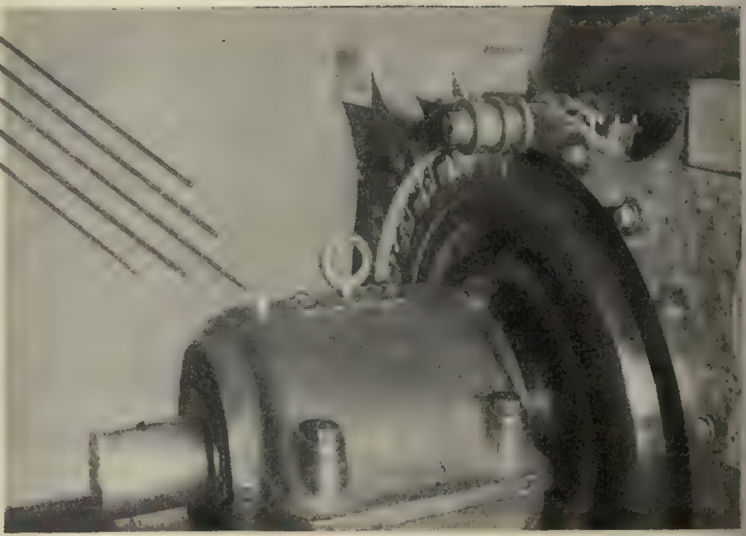
BALANCED

so accurately that a coin will stand on edge

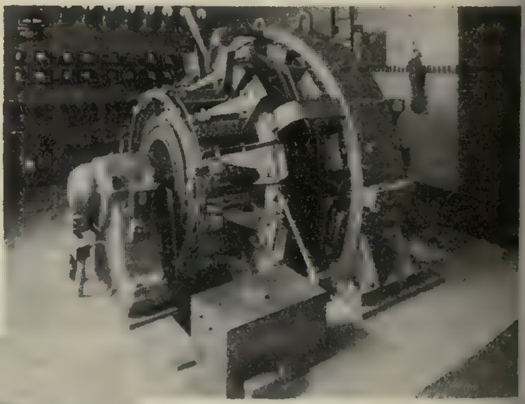


The "coin test" for balance.

SMOOTH operation of any electrical machine depends upon accurate balance—both electrical and mechanical.

The city of Detroit recently installed a 2000-kw. Westinghouse Synchronous Converter which operates so smoothly that a coin the size of a nickel can be stood on edge on the bearing cap with the machine running under load.

Westinghouse Converters are of perfectly balanced design and will give you efficient service with smooth operation.



Above—Installation view of 2000-kw. Westinghouse Synchronous Converter in the Turner substation of the City of Detroit.

Below—Exterior view of the Turner substation.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

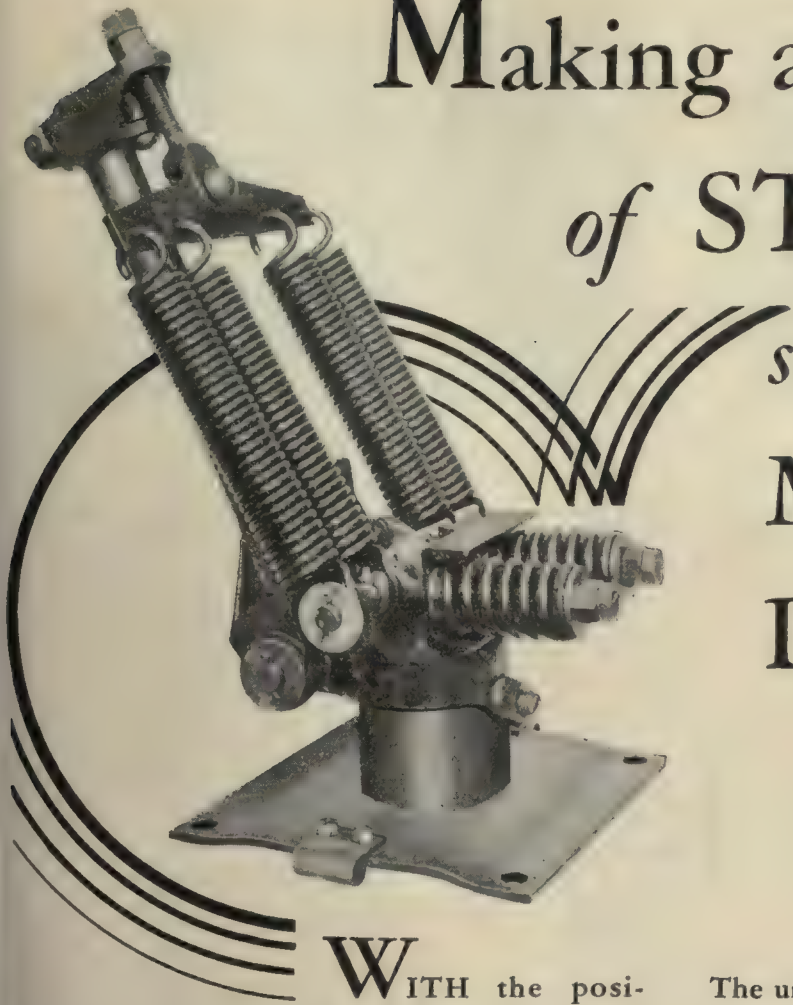
Westinghouse

WESTINGHOUSE ELECTRIC

T 31434

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

Making a few pounds of STEEL *save* Maintenance DOLLARS



WITH the positive-acting spring buffer on the new Westinghouse-Nuttall US-24-A Trolley Base, significant cost-saving advantages in operation and maintenance are afforded.

Made entirely of steel, exposure to weather has no deteriorating effect upon the sensitiveness of this buffer. Nor are renewals necessary, for with all-metal construction, the lasting strength and durability that has been built into the rest of this new all-steel base are fully matched.

The unvarying certainty with which this buffer quickly and effectively stops pole oscillation, minimizes the possibility of damage to trolley and overhead equipment.

Adjustable springs provide a means of easily varying the activity of this buffer to get the most desirable effect with different pole equipments or under other variations in operating conditions.

Yet, even with the 8¼ pounds of steel used to afford these advantages on a spring buffer, the total weight of the US-24-A Trolley Base is only 77 pounds.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

WESTINGHOUSE ELECTRIC

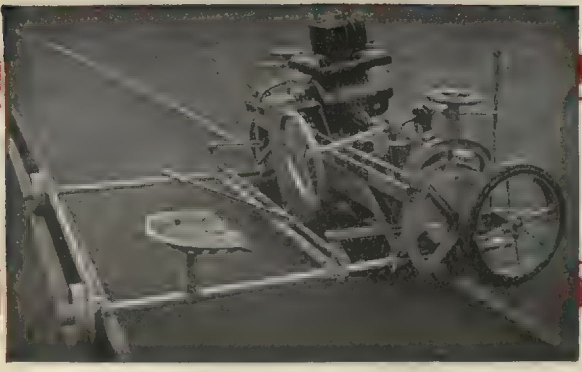
T 31467

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

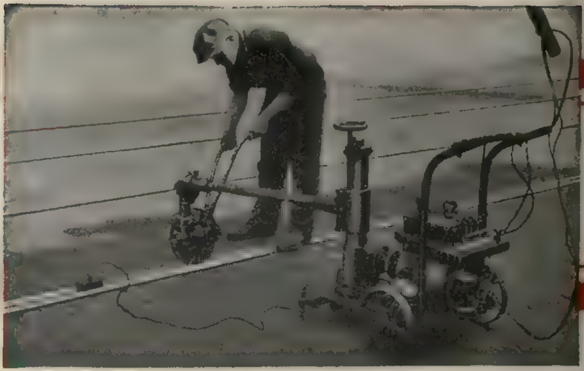
Imperial Track Grinder

RTW Curve Oiler

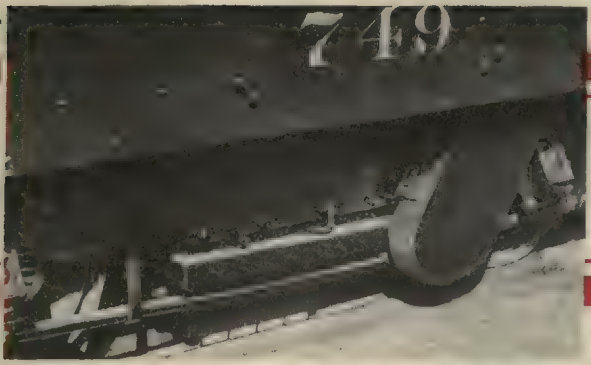
"Not a Jar in a carload"



Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Reciprocating Grinder Car, showing one of the grinding units.

Heavy Duty Reciprocating Rail Grinder.

"Rock a bye baby
On the street car;
You can sleep soundly
With nothing to mar
Your dream so restful,
So quiet, serene;
Not a jar in a car load
In this limousine."

—*Cincinnati Commercial Tribune*

That's what good track does.
Grinding makes it good.
Grinding keeps it so.
The tools shown here do it economically.

Railway Trackwork Co.

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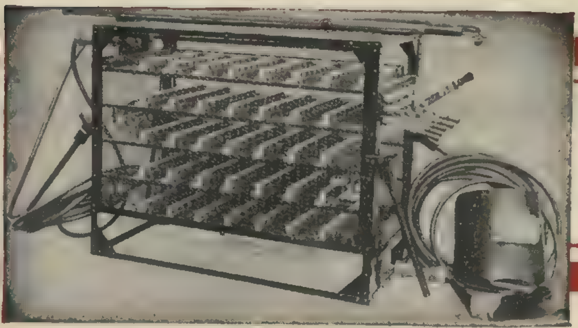
Reciprocating Track Grinder



Ajax Electric Arc Welder

TWO IMPORTANT NEW IMPROVEMENT
IN THE
O-B Trolley Wheel
ADD SURPRISINGLY TO SERVICEABILIT

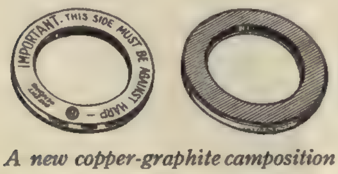
SEVERAL years ago O-B introduced an entirely new principle in trolley wheel design. This new wheel offered outstanding service advantages—including two and three times the mileage formerly expected from a trolley wheel.

Oiling was done away with because graphite plugs inserted in a one and one-half inch axle provide for wheel lubrication. This factor alone resulted in remarkable savings, for cost of trolley wheel oiling is a considerable item each year on any electric railway property.

Scores of properties service tested the O-B Trolley Wheel. Many found that it vastly bettered current collection—that mileage was greatly increased—that maintenance was reduced to a minimum. These properties adopted the O-B Trolley Wheel—and they have been highly gratified with results.

Now, painstaking studies into the experience of these properties have indicated certain improvements which provide even better service from trolley wheels.

The first result of these studies has been the replacement of the fibre washer between the hub and the harp with a copper-graphite composition washer. This new washer—proved by over a year of testing in service—effectively improves current collection.



A new copper-graphite camposition washer, formed by pressing composition into a brass retainer cup.

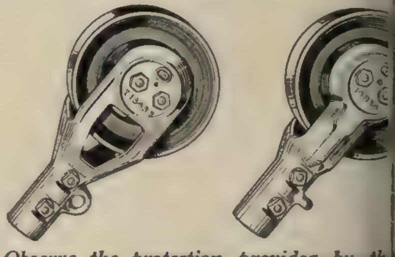
The fibre washer was an insulator. This caused all of the current to pass through the axle to the harp. The new washer—an excellent cond
—permits most of the current t
directly from the wheel to the
through the washer. Thus
tendency toward the pitting
axle, and the inside of the hu
been effectively eliminated.

Besides this, the copper-gr
composition washer is a lub
for the wheel, reducing wear
ends of the hub and doing
with end play in the wheel.

This proved feature has "ste
up" mileage with a correspo
reduction in wheel mainte
And even more important, th
missible operating speed has
greatly increased, thus wideni
proper use of O-B wheel to ci
semi-high speed suburban ser

A further improvement has accomplished by redesigning the harp. It now materially greater protection to the wheel, especi dewirement, if the harp strikes span wires.

Thus, O-B contributes again to further reduction in operating costs by adding miles and better service to the unusual service already being rendered by the O-B Trolley Wheel.



Observe the protection providea by th harp (at the left) as compared to the old

A trial installation proves this saving. The next or four summer months provide an excellent oppor for you to demonstrate to your own satisfaction th O-B Trolley wheel should be on all your cars.

MORE LITTLE ACORN
WHICH WILL GROW IN
TO BIG OAKS.

OPERATING expense is made up of countless small items, many of which are not readily visible. But little savings in labor here, a little more service life there, when totaled grow into important sums. They are like the little acorns which grow into big oaks.

O-B Una Rail Bonds

THE CHOICE OF 120 ELECTRIC RAILWAY PROPERTIES

HEN the doorbell rings, an be rather certain that body is at the door. Cir- tantial evidence is often as ncing as direct evidence. arly, the fact that 120 elec- railway properties in the United States and Canada use O-B Una Rail Bonds indicates that these bonds must offer some unusual service, a greater economy, or both.

Una Type Rail Bond

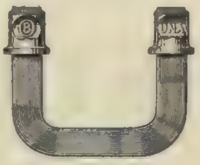
The facts are quite apparent. Bonding by the Una process is quicker, a definite saving in instal- costs. Bonds thus ap- form a homogeneous between the rail and ond strand, the union a dense and very strong r weld, with high me- cal strength; a resist- o shear of about 32,000 r terminal. Thus max- electrical conductivity niform low electrical nce in the track circuit nitely assured for the long life of an O-B ond.

Una Type CL Rail Bond

nusually strong bond result of the Una car- old, which holds the g metal in a molten Thus, the temperature strand and the rail are t up to the tempera- f the welding metal. Porosity in the weld is eliminated by the "puddling" action of the molten metal in the mold.

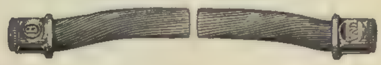
A view of the right-of-way of the Chicago Rapid Transit Co., Chicago. This property is an extensive user of Una Rail Bonds.

As a result of these definite and outstandingly superior qualities of all Una rail bonds, many leading electric railway properties have standardized on Unas. These properties, over 120 in number, have had adequate proof by actual experience that the service life, strength and uniform low resistance of the Una rail bonds is equal to expectations.



O-B Una Type LUA Rail Bond

An O-B Una Rail Bond when properly applied by the carbon mold process, either with a resistance welder or motor-generator set, becomes as much a part of the rail as sugar becomes part of the cake. The use of O-B Duron welding rod is a great aid to proper application.



O-B Una Type CBA Rail Bond

Seven types of O-B Una Rail Bonds adequately provide for every bonding requirement. All are fully described on pages 53 to 63 of New Products Supplement No. 3 to O-B Catalog No. 20. If your copy is not quickly available, a copy will be gladly sent upon request to Ohio Brass Company, Mansfield, Ohio. In Canada, Canadian Ohio Brass Company Limited, Niagara Falls, Canada.

1282CB

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
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VALVES

Stalwart Strength

is built into

GENERAL ELECTRIC

POLE LINE HARDWARE

and

Construction Specialties

YOU can count on General Electric Pole Line Hardware for long life and dependability. G-E standard quality is always there.

High-grade, open-hearth steel expertly treated, processed and finished goes into every metal part.

And each one is *double-dipped hot galvanized* to give highest resistance to rust...to make its unexcelled strength *enduring.*

General Electric makes a complete line of pole line hardware and construction specialties—everything for pole line service in the railway field.

G-E Guy Thimble and Square Washer
G-E Guy Clamp with diagonal RIDGE to fit STRAND.
G-E Strain Plate flexible enough to fit around any size pole.
POLE LINE HARDWARE AND CONSTRUCTION SPECIALTIES CATALOG
MERCHANDISE DEPARTMENT GENERAL ELECTRIC COMPANY BRIDGEPORT, CONN.

DOUBLE-DIPPED
HOT
GALVANIZED!

G-E Standard Anchor Rod has unsurpassed strength and durability.

Write for the new catalog!

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General Electric Co., Bridgeport, Conn.
Please send me the new G-E Pole Line Hardware and Construction Specialties Catalog.
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GENERAL ELECTRIC
POLE LINE HARDWARE

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NOW IS THE TIME TO CONSIDER HEATING FOR YOUR BUSES

A new type of Keystone roof ventilator which may be used in conjunction with the Mueller-Evans heating and ventilating system or independently.

GET DATA ON THE SIMPLE AND PRACTICAL

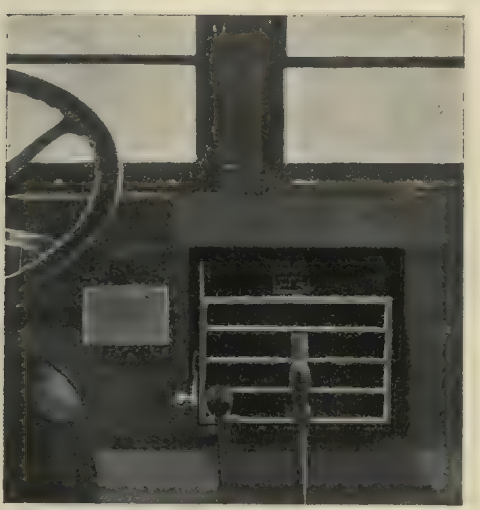
MUELLER-EVANS SYSTEM

A MODERN, up-to-date system of forced heating and ventilating which utilizes the fan of the motor and the heated air as it comes through the radiator. This fresh heated air is forced through a duct into the bus body. It provides 60° of warmth in zero weather and abundant fresh air which is the only way to prevent the ingress of gas and other odors. The system is simple in construction—easily removable and is not subject to wear. It costs nothing to operate. It is easy to install and is relatively low in first cost as compared to other complicated systems. The Mueller-Evans system is the answer to your problem of bus heating and ventilating. Write for complete data.

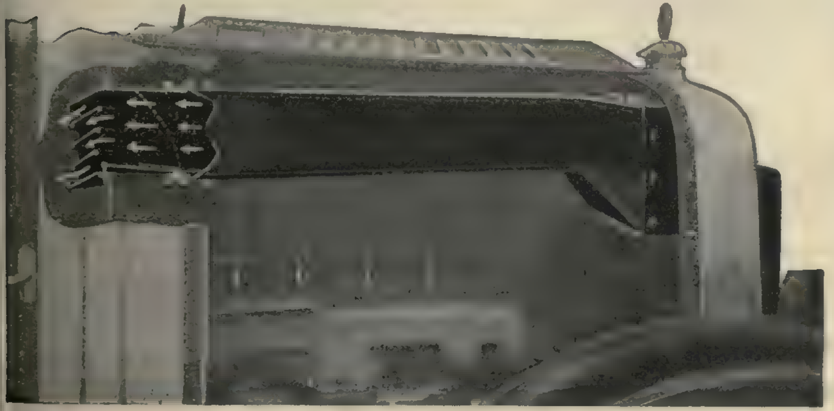
ELECTRIC SERVICE SUPPLIES CO. Manufacturer

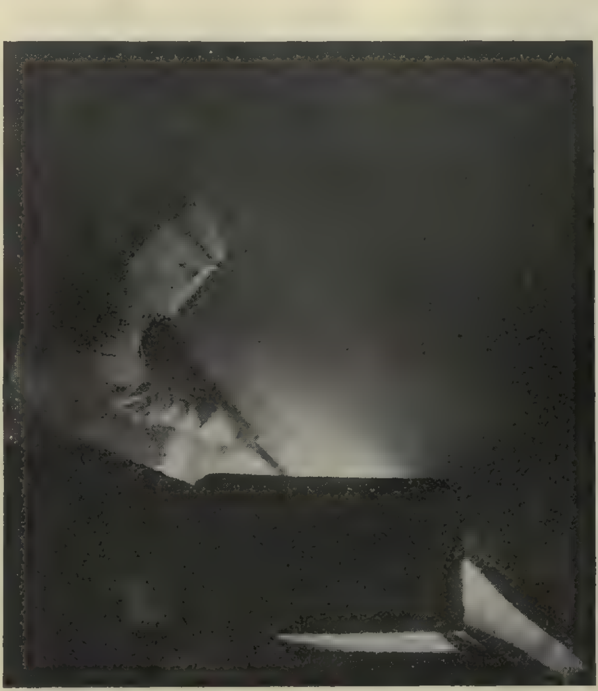
RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Home office and plant at 17th and Cambria Sts., PHILADELPHIA; District offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube and Supply Company, Ltd., Montreal, Toronto, Vancouver, Winnipeg.


This air diffuser, installed in dash, distributes the warm air.

Radiator shutters as installed on M-E equipped bus.


Air duct which conveys warm air from back of radiator into bus body.



MANGANESE WELDING HAS PROLONGED THE LIFE OF MANGANESE FROG AND CROSSING CASTINGS FROM TWO TO SIX YEARS

STOODY MANGANESE WELDING ROD applies equally well with alternating or direct current. The fact that it applies easily, as well as the fact that it forms a smooth, hard deposit which requires little, if any, grinding makes this rod particularly suited for night welding on street railways . . . If you haven't tried STOODY MANGANESE WELDING ROD . . . see your nearest STOODY JOBBER or write.

STOODY COMPANY

Manufacturers of

Welding Rod ◆ Alloy Steels ◆ Equipment

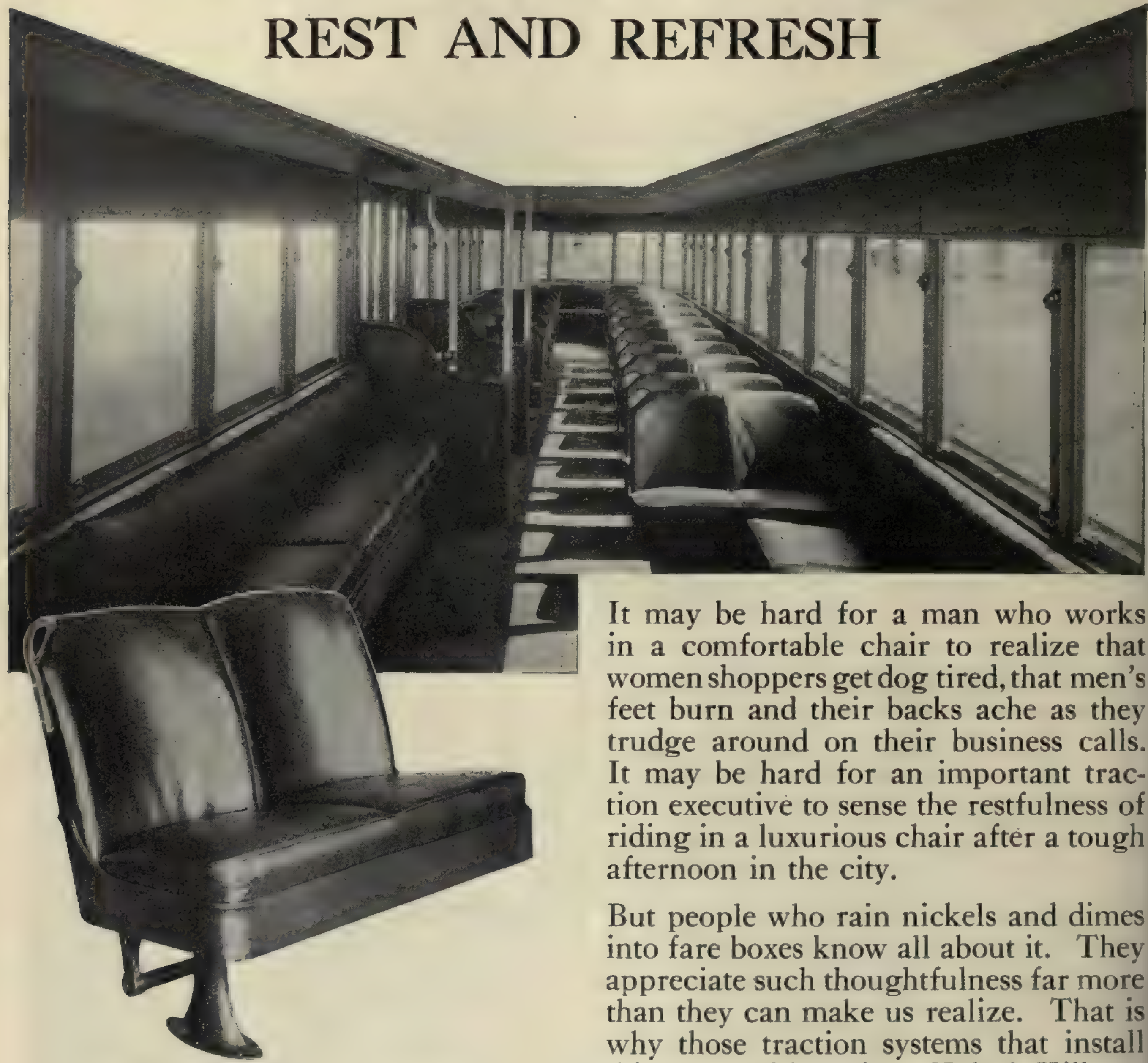
WHITTIER, CALIFORNIA

Even a child finds the NP Treadle operated exit door

The Easiest Way Out - - -

NATIONAL PNEUMATIC CO

CAR SEATS LIKE THESE REST AND REFRESH



It may be hard for a man who works in a comfortable chair to realize that women shoppers get dog tired, that men's feet burn and their backs ache as they trudge around on their business calls. It may be hard for an important traction executive to sense the restfulness of riding in a luxurious chair after a tough afternoon in the city.

But people who rain nickels and dimes into fare boxes know all about it. They appreciate such thoughtfulness far more than they can make us realize. That is why those traction systems that install this new and luxurious Hale & Kilburn seating are enjoying increased income from their communities.

These new Osgood Bradley cars are equipped with Hale & Kilburn No. 909 seats and the Brooklyn and Queens surface lines find that they are very popular with passengers.

◆

HALE & KILBURN CO.
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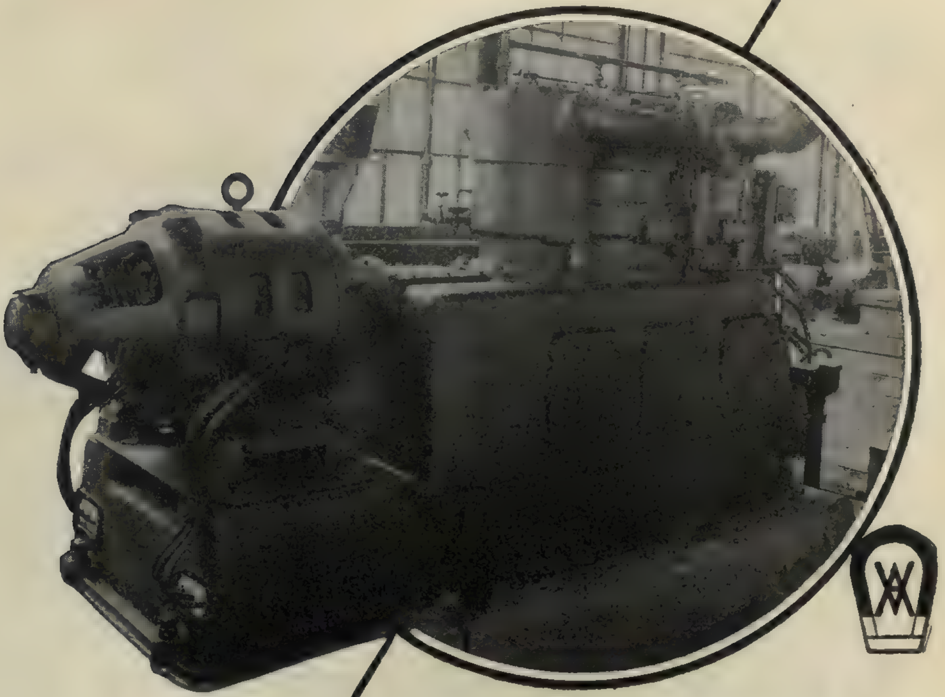
HALE & KILBURN SEATS

WESTINGHOUSE-NATIONAL
Air Compressors



POWER HOUSE

CAR BARN

SHOP

WHEREVER there is a need for compressed air on street railway properties, Westinghouse-National compressors can and are being used. For every requirement — in power house, car barn, shop, or on the right of way—there is a suitable type and size available (ranging from 2½ to 700 cu. ft. displacement).

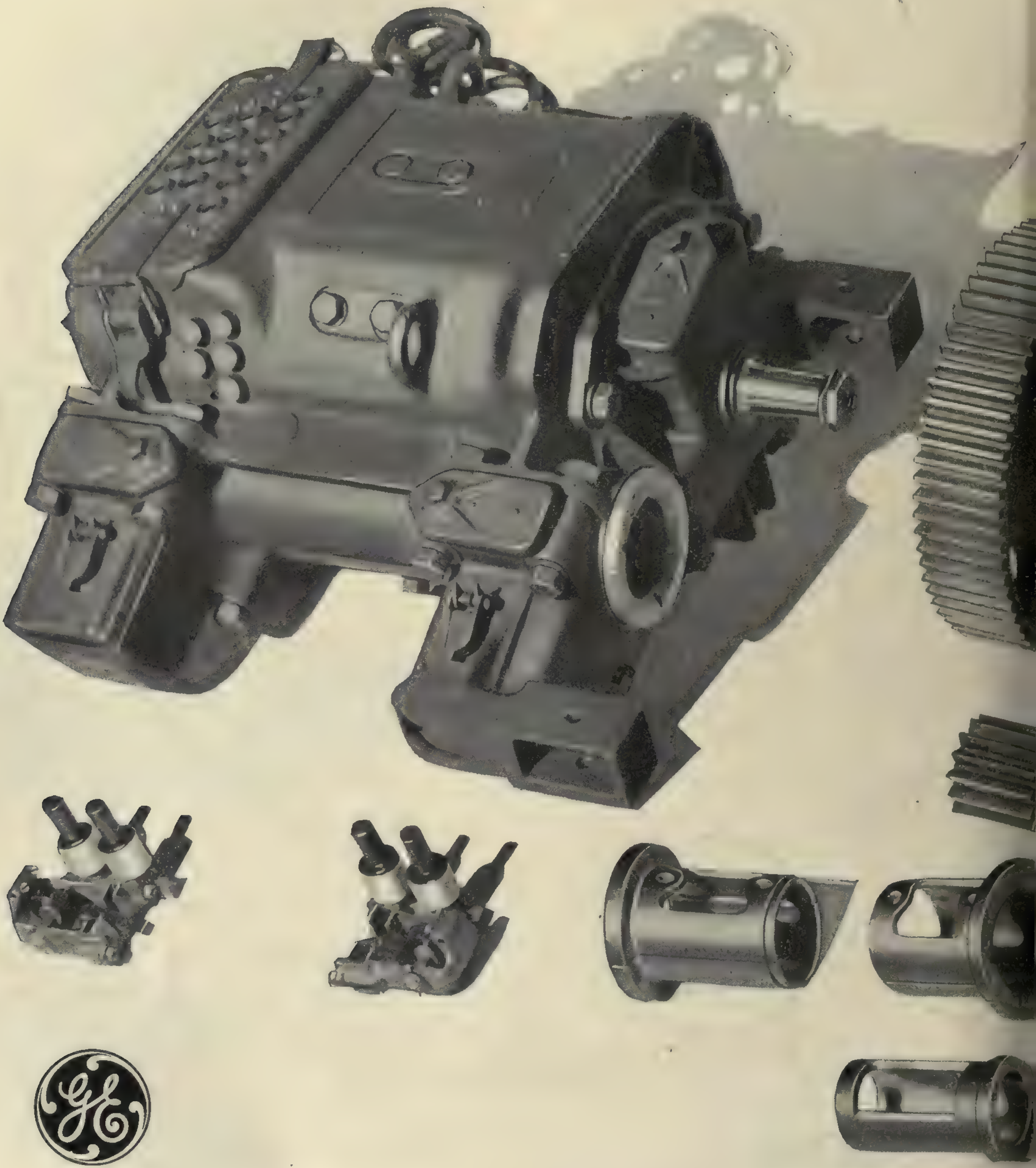
When you think compressed air for any purpose, think Westinghouse-National!

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: Wilmerding, Pa.

"QUALITY MACHINES FOR QUALITY SERVICE"

General Electric Renewal Part



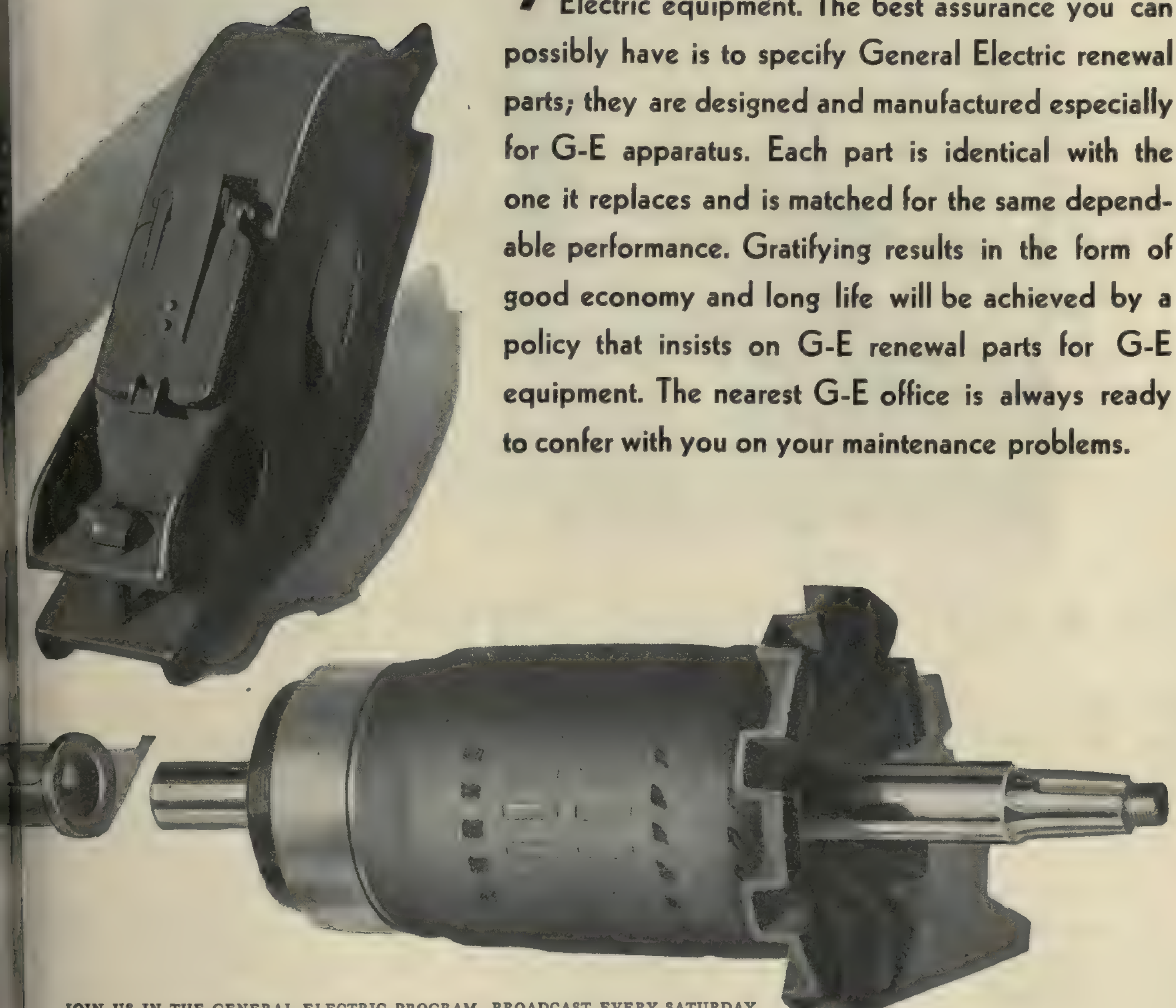
GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

for General Electric Equipment

...the one way to be assured of original-equipment quality

YOU expect the utmost service from your General Electric equipment. The best assurance you can possibly have is to specify General Electric renewal parts; they are designed and manufactured especially for G-E apparatus. Each part is identical with the one it replaces and is matched for the same dependable performance. Gratifying results in the form of good economy and long life will be achieved by a policy that insists on G-E renewal parts for G-E equipment. The nearest G-E office is always ready to confer with you on your maintenance problems.



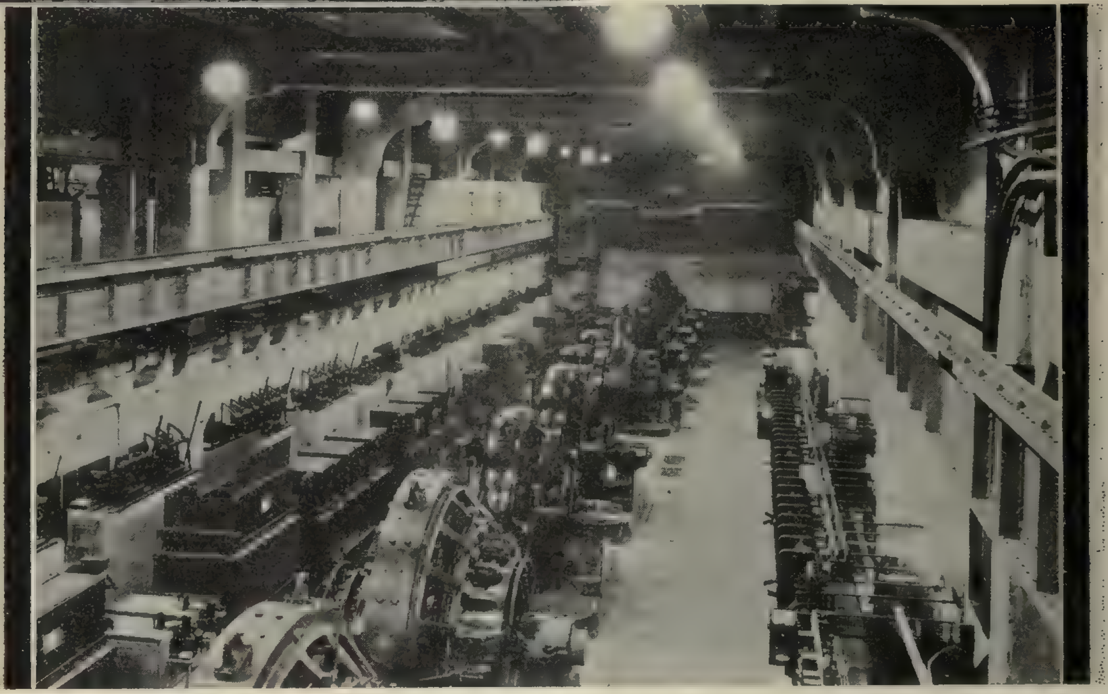
JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

330-149

ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

100 FEET BELOW THE SIDEWALKS OF NEW YORK



Courtesy New York Central Railroad

GRAND CENTRAL SUBSTATION

ONE of the most remarkable substations in existence has recently been completed by the New York Central Railroad—100 feet below the street level at Forty-third Street and Lexington Avenue. ¶This substation, which supplants a smaller one formerly located at Fiftieth Street, supplies power for the operation of trains as well as the lighting of several large buildings in the terminal zone. The equipment includes ten G-E synchronous converters, several being of 4000-kw. capacity, and G-E manual switching apparatus. ¶G-E engineers coöperated with the Railroad Company in making the installation without interruption of service to either the railroad or to the buildings. This was an unusual achievement when one considers that much of the equipment of the new substation is the same equipment that was formerly in operation at the Fiftieth Street substation.

130-25

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

John A. Miller, Jr., *Managing Editor*

Volume 74 New York, August, 1930 *Number 9*

Chicago Transit Settlement a Message to the Industry

CHICAGO'S display of good sense in passing the franchise ordinance providing for co-ordination of transit facilities was more than a victory for the companies involved. Important as it was to the city and the local railways, the adoption of the ordinance really was a victory for the entire industry in that it recognizes more effectively than do other modern grants, the right of the companies to live and the community of interest that exists between them and the municipality.

There is a far-reaching civic aspect to settlements of this kind, and Chicago took that aspect properly into consideration. The rapid transit lines, with a 50-year renewable franchise granted under the steam railroad law, were in a good position. On the other hand, the grant of 1907 under which the Surface Lines was operating was limited to a term of twenty years in accordance with state corporation law. For nearly this entire period it has been difficult to obtain money for development of the property to meet the city's growth. In the face of the expiring franchise and the uncertainties that necessarily are a part of negotiations for a new grant, however, the Surface Lines never let down. By this attitude the railway built up public good will which was an influential factor in the favorable outcome of the recent referendum.

In the new deal, recognition has been secured of the right of the companies to live. The principles have been established that they are entitled to rates that are self-sustaining, that subways shall be built with city money and by the assessment method, that the terminable permit is a sound device, that valuation is more than a matter of barter and trade and should be carried forward on a basis of fact, and that any excess earnings over an amount needed by the companies to carry on aggressively day by day shall go to the general improvement of the system at once. These are matters of great significance as reflecting changed points of view—points of view that augur well for Chicago in the future.

In addition, the new grant is significant in that it recognizes the fact that a comprehensive program of rapid transit development should be the backbone for the future, while it takes full account of the need for the intensive use of the street car, the bus and the trolley bus, in their respective fields. In the future the character of the traffic carried on the surface lines is likely to change greatly. As they lose in through riders, they will become increasingly important as feeders. Now only 20 to 30 per cent of the total of passengers carried in Chicago are transported on the rapid transit lines. Under unification these proportions may be expected to change, but only to the extent that scientific planning shall determine.

Already a start has been made on the program of improvements—a start that calls for the immediate expenditure of $12,000,000 even before formal acceptance of the grant has been filed on behalf of the new consolidated company. Articulation and rapid transit planning are going ahead. The more pretentious parts of the $200,000,000 program calling for rapid transit construction must necessarily proceed slowly toward realization, but co-ordination of existing facilities and the building of supplementary surface tracks and the installation of bus and trolley bus lines will go forward at once and as fast as is consistent with careful planning.

Politics Should Not Be Permitted to Seep Into Utility Regulation

DISQUIETING proposals have appeared of late indicating politics is likely to play a larger part in utility regulation in the future than it has in the immediate past. Not long ago the governor of New York spoke of the need for "a strong-arm man who will bring the [Public Service] commission back to its original role of defender of the public interest." During recent sessions of the legislatures of various states, a number of ill-considered and impracticable measures, aimed at the utilities, were introduced. The cry has been raised that it would be better for the state to own the utilities than for the utilities to own the state. While the electric railways were not, in most instances, the primary targets of the law makers, the industry cannot afford to stand aloof on the side lines and watch.

Utility regulation has evolved painstakingly. Many utility heads have accepted the idea reluctantly, but the majority have realized its advantages. They were for it in the beginning and they are for it now. Those who have done things in contravention of the regulatory law, however, have been sufficient in number to give political promise to the cry that regulation has broken down. By its very nature regulation, born as the result of popular hue and cry against the utilities, has always been susceptible to the charge of manipulation. The original idea was to take the utilities out of politics by means of regulation. In this a considerable measure of success was achieved. But of late it has been apparent that politics is playing an ever increasing part in regulation. Therein lies a serious menace to the future of the utilities.

High-minded men in the industry sense the growing menace. Supine acceptance of regulation by the utilities is one thing: unyielding opposition to the exercise of the right of the state to have a hand in the control of its own creatures, is something quite different. The question is not merely whether certain practices are legal, but whether under present economic and social conditions, they are in the public interest. The situation is fraught with grave dangers. The utilities can meet it most successfully by keeping the public informed on fundamental principles of valuation, rate-making and similar subjects which are the chief concern of regulation. The idea of regulation is sound. The menace to regulation lies in its possible political perversion. Any serious threat at the commissions imperils the railways.

Merit Alone Should Control Substitution of Buses for Cars

THAT something should be done to improve surface transportation facilities in New York City has long been apparent. Recently attention has been focused anew on this important subject by the proposal of the New York Railways to substitute buses in place of cars on all of its lines. As the interests which now control this company have always been staunch advocates of the bus as a mass transportation vehicle, it is not surprising that they should suggest buses as the solution of the problem. Moreover, there has been considerable public and political agitation for the creation of an extensive system of bus routes in Manhattan. The establishment of such a bus system upon a competitive basis would almost certainly have a ruinous effect upon existing street railway lines. Substitution of buses for cars on the routes of the New York Railways might, however, forestall the establishment of an independent bus system.

That the proposed wholesale substitution is actually the best solution of the surface transportation problem seems doubtful. Conditions are not the same on all of the routes of this company, and the type of vehicle which is best suited for one is likely to be unsuitable for another. The particular needs of each route should be studied. Where the bus is a better vehicle than the street car to meet these needs, the substitution should be made. Where the street car is a better vehicle, it should be retained.

Exaggerated ideas of what can be accomplished by bus substitution are prevalent. While the bus is an excellent vehicle for certain purposes, those who expect to find in it a miraculous cure for all of New York's transportation troubles are doomed to disappointment. Many of the advantages which the bus possesses under favorable circumstances would be lost under the conditions existing in mid-town Manhattan.

For example, one of the ordinary advantages of the bus is its ability to draw up to the curb to receive and discharge passengers. In New York, however, the advantage actually gained through this flexibility is comparatively small. With almost universal parking, the curb is inaccessible. Even where there is no parking, buses seldom pull in closer than 5 or 6 ft. from the curb. No doubt it is easier for a prospective passenger to wait on the sidewalk and step out this short distance to board a bus than it is for him to wait unprotected in the center of the roadway for a street car. But there is no reason why he need wait without protection. The safety isles used in scores of other cities provide waiting places as safe as the sidewalks. They could be used equally well in New York.

Speed is often cited as an advantage of the bus, but this advantage could not be realized on New York's congested streets, where all vehicles have been forced to crawl because of the system of traffic control. At present the car speed on the New York Railways averages 6 m.p.h., while the average speed of the Fifth Avenue Coach Company's buses is a little more than 7 m.p.h. The latter, however, includes considerable operating outside the congested area. In Chicago, where modern traffic signals are used and all parking is prohibited in the business district, the average speed of street cars is 11.44 m.p.h., and even in the most congested section, the Loop, it is between 6 and 7 m.p.h. From this it would appear that speed depends on traffic conditions rather than on the type of vehicle.

A widespread belief prevails that general substitution of buses for cars would contribute to the relief of traffic congestion. In reality, the result would probably be to make congestion worse on heavily traveled routes, as more vehicles would be required to handle the same number of passengers and these vehicles would be weaving in and out across several lanes of traffic, instead of moving in a straight line in the center of the street.

On heavy traffic lines the bus possesses no advantage over the modern car from the standpoint of operating cost. Because of the age and worn-out condition of its equipment, the present operating cost of the New York Railways is extremely high, being in excess of 53 cents per car-mile, while revenue is 66 cents per car-mile. Buses certainly could be operated for considerably less than 53 cents per mile. In fact, the costs of the Fifth Avenue Coach Company are now about 45 cents per mile. If buses were substituted in place of cars, however, a considerable increase in the number of vehicle-miles would be required to accommodate the heavy traffic, and the receipts per bus-mile would be materially less than present car-mile receipts. On the other hand, experience in other cities shows that modern street cars can be operated for less than 40 cents per mile, and their use in New York would permit a reduction from the number of car-miles now operated with a corresponding gain in car-mile receipts.

In view of these facts it appears that complete substitution of buses for cars on all the lines of the New York Railways would be a mistake. While improvement in surface transportation facilities is urgently needed, it would be well to proceed with sufficient deliberation to assure the selection on each route of the type of vehicle which is best suited to meet its particular transportation needs.

City Transit Problems Are Becoming Better Understood

TRAFFIC engineers, city planners and operating officials of public transit facilities have long recognized that the street car, the bus and the taxicab have definite places in the general scheme of urban transportation. Transportation to be successful must be profitable. Uncontrolled and unregulated competition has always proved detrimental to profits. Not only do the operating companies suffer, but the service rendered to the public also suffers.

That these simple facts are becoming more widely understood is encouraging. Publications other than those of the technical press are discussing traffic and transportation problems more frequently. Editors are presenting to their readers the basic problems of city transit and are appealing for support in their solution.

In a recent issue of the *Saturday Evening Post* the leading editorial discussed the subject of co-ordinated transportation and particularly the evils resulting from cut-rate or low-rate taxicabs. It was pointed out that in the great majority of places the street car easily carries the bulk of the load, and that no substitute can take its place because of the inherent lack of street room. "Buses, taxicabs and private automobiles are all important and desirable," continued the editorial, "but they are less essential than the street car or subway, where there is one, and city transit cannot reach its proper goal until this fact is taken more fully into consideration by city planners and traffic experts."

Appealing for regulated co-ordination the editorial continued: "Just as the street railway deserves a living wage, so does the taxicab. Just as one is a proper subject for strict regulation by a utilities commisison, so is the other. It is difficult to see how conditions can be anything but chaotic unless the number of taxicabs are regulated and unless reasonable fares, both maximum and minimum, are provided by public utility."

Views such as these, based on sound reasoning, presented in an unbiased manner to the millions of readers of the *Saturday Evening Post* undoubtedly will have a far-reaching effect.

Few Pension Plans on a Sound Basis

PENSION plans for veteran electric railway employees appear to be approaching a critical period in their development. In one recent instance, it was necessary to revise pension rates downward because the expense threatened to become too heavy for the company to carry. On another subway system, additions to the pension roll have been temporarily suspended for a similar reason. Confidential replies received to an inquiry recently made by the JOURNAL indicate that a considerable number of electric railway managers are apprehensive concerning the future status of their pension plans. Evidently it is time for the industry to pause and consider the situation carefully.

Apparently the difficulty arises because a majority of the present pension plans were not originally established on a sound actuarial basis. The payment of benefits is now found to be exceeding the early estimates. In part, this is due to the increase which has occurred with the passage of time in the number of eligible employees. In part, it is due to the present high wages upon which the pensions are calculated, which were not foreseen when the plans were first established. There is a cumulative effect which must be viewed at long range to be fully appreciated, and few railways appear to have realized at the beginning what the ultimate results would be.

With the exception of a small number of railways which have established reserve funds, it is the practice to make current pension payments out of current earnings. In this the electric railways are following the practice imposed upon the steam railroads by the Interstate Commerce Commission. It is inevitable, however, that with obligations increasing steadily, difficulties will be encountered in making pension payments by this method. No company should agree to make a future obligation without at the same time making some provision for funds from which to pay it.

Despite the difficulties which are being encountered, the railway executives replying to the JOURNAL'S inquiry were unanimous in expressing the belief that the railways should provide pensions for veteran employees. This is not a matter of charity, but of sound business practice. To be successful, however, pension plans must be based upon something more than good intentions and guesswork.

Increasing Speed Through Detailed Analysis

SPEED is one of the most vital factors in modern surface car transportation. Passengers are interested in comfort, convenience and attractive appearance of cars, but they are even more interested in speed. If one of the original electric cars of 40 years ago could, by some magic, be made to travel at 40 miles an hour, it would undoubtedly be able to take away business from the more comfortable and attractive electric car of today, operated at present speeds. Only in so far as its speed enables it to hold its place in traffic, can the electric railway car hold its place in the transportation scheme.

All this is well understood by electric railway men. Merely to say that speed is essential, however, accomplishes little. The vital question is how to increase present speeds. So many difficulties lie in the way of achieving this objective that operating officials frequently become discouraged. Perhaps one reason for this is that the problem is usually looked at in its entirety. Viewed in that way, the difficulties appear exceedingly formidable. But if the problem is broken down into component parts and each part considered by itself, the obstacles no longer seem insurmountable.

The first step in this direction might well be to make a detailed analysis to determine accurately the actual speed on short sections of each route. Preferably, the limits of these sections should not correspond with old established time points, but should be points arbitrarily selected at approximately equal distances along the line. Such an analysis will show a wide variation between the speed on some sections and the speed on others, and it is quite likely that loss of time will be disclosed at unexpected places. By attacking these problems one by one, a number of small improvements can be made which, in the aggregate, will produce a substantial reduction in the over-all running time.

Many of the contributory causes of slow operating speeds are within the control of the railway. Frequently it will be found that the acceleration and braking rates are too low. Perhaps the cars have not sufficient power to negotiate the grades. It may be that the entrance and exit arrangements prevent quick loading and unloading of passengers. Sometimes it is wrongly supposed that safety demands slow speeds. Or it may be that time is lost because of long established operating customs that could easily be changed. Looking at the problem as a whole, it is often difficult to discern the true reason for slow operation. Looking at it in detail, the reasons soon become evident.

The method of detailed analysis is valuable also in studying conditions outside the immediate control of the railway. A widespread tendency exists to blame traffic congestion for most of the delays which occur in street car operation. Certainly there is considerable justification for this attitude. But the municipal authorities are probably doing the best they know how to speed up traffic movement. Specific suggestions are of infinitely more value than a general indictment of existing conditions. If a particularly bad situation is pointed out to them and a means of improving the railway service suggested, the municipal authorities will usually be entirely willing to co-operate in effective improvement.

No magic solution of the problem is likely ever to be found. But the first step in effecting improvement is exact knowledge of what the trouble is, and where it occurs. Only by detailed analysis can these questions be answered.

Clark Street, one of Chicago's principal thoroughfares, passes through the heart of the famous Loop district. This picture is looking north from Van Buren Street

Chicago to Have Immense Transportatio

RATIFICATION, on July 1, by a vote of 325,837 to 56,690—nearly six to one—of the new Chicago transportation ordinance marked the completion of the efforts of the city authorities, public bodies and the companies involved, to arrive at a plan to give the city of Chicago and the entire metropolitan area a unified local transportation system. The campaign has been prolonged many years and has gone through vicissitudes of various sorts, but out of it has been evolved a plan which should give Chicago a type of local transportation second to none in the world.

The ordinance, which was passed by the City Council on May 19 by the affirmative vote of 47 of the 50 aldermen, calls for a comprehensive unified local transportation system for Chicago and the metropolitan area. It is based on principles which long have been agreed to by leaders of thought on the subject. Elevated lines, subways, surface cars and buses are included in the plan. In addition to the consolidation of systems, a city-wide program for extensions, additions and improvements to the transit system is mapped out in the ordinance. The new company which is now being formed, to be known as the Chicago Local Transportation Company, will be required to expend at least $200,000,000 during the first ten years of the grant, in the construction of extensions and additions which are specifically described in the ordinance. Of this sum, $65,000,000 must be expended during the first three years of the grant. Thus the project provides not only for a system adequate for the immediate needs of the city but capable of expansion to meet future demands. Further extensions, additions and improvements may be required by order of the Transit Commission upon the authorization or direction of the City Council. Many more extensions and additions may be required during the first ten-year period as well as thereafter.

Twice before ordinances for unification of the transit facilities in Chicago have been prepared and adopted by the City Council. But both were defeated at the polls. In addition, numerous plans have been worked out in more or less detail which have been discarded before being brought to a vote. It is needless to recapitulate here the various projects that in the past have been suggested for solution of the transportation problem. They have been discussed in detail in this paper from time to time.

The ordinance, in its final form, represents the united efforts of the City Council's committee on local transportation, of which Joseph B. McDonough, alderman of the Thirteenth Ward, is chairman, and its sub-committee, aided by the Citizens' Traction Settlement Committee and various civic organizations. The work on this draft of an ordinance dates back to June, 1928, and its provisions are based on legislation obtained at the last session of the Illinois General Assembly. This legislation was necessary to remove certain bars which stood in the way of the consolidation. One of these was that the elevated lines were organized under the steam railroad law, while the surface lines were organized under the street railway law. Another was the removal of the definite twenty-year term from the franchise, which was the maximum permitted in the state.

HOME RULE A FEATURE

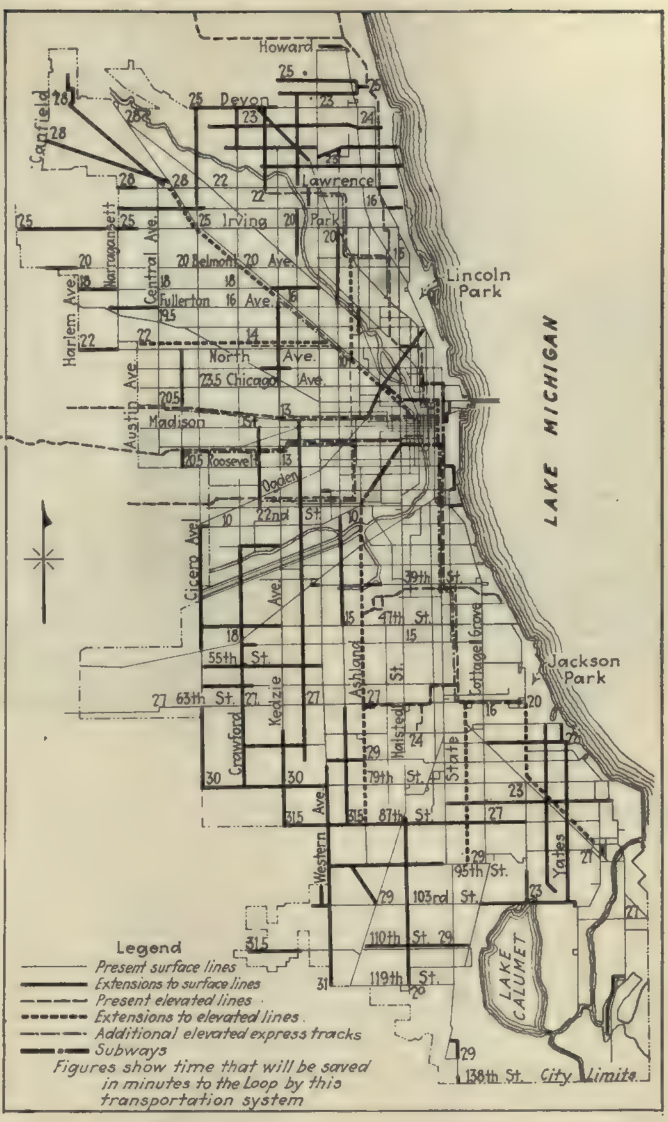
Provision is made in the ordinance for a comprehensive unified local transportation system, operated under a terminable permit by one corporate management, and subject to control of a local home rule commission of three members to be appointed by the Mayor. In addition to the expenditure of $200,000,000 by the company within the ten-year period, the city is to build a subway system in which it will invest the sum of $100,000,000 and for which the company will provide equipment and operate cars as a part of the rapid transit system, the cost of the subways to be met by use of the city transit trust fund and such special assessments as can be levied upon the property especially benefited.

Ratification by voters of ordinance for unified transit assures construction in ten years costing $200,000,000. This includes rapid transit, surface cars and buses. In addition the city will construct subways costing $100,000,000. Details of the ordinance are given

Development

The initial rates of fare provided in the ordinance are to be unchanged from those at present existing on the rapid transit and surface lines. There is, however, a provision that transfers will be issued between the two systems. Free transfers will be given from the rapid transit lines to the surface lines, and transfers will be given from the surface lines to the rapid transit lines on payment of 3 cents. Universal transfers on all of the surface lines and on all the elevated lines are to be maintained, providing for a continuous ride in one general direction over the entire system.

Under the new ordinance the company is to pay, as compensation for the use of public property, 3 per cent of its gross receipts, plus any excess in any fiscal year over a just and reasonable return as fixed from time to time by the local transit commission. The gross receipts of the existing traction companies for the year 1929 were $83,985,242, of which 3 per cent would amount to $2,519,557. This is slightly less than 55 per cent of the net receipts for the year, which is the amount that would be paid under the present arrangement with the surface lines, plus the small amount received from the elevated lines. This 3 per cent, however, will increase in amount with the growth of population and traffic and with any increase in the rate of fare, while the net receipts may be substantially reduced by increased operating expenses, such as the employee pension fund.



This map of the Chicago transportation system indicates how the $300,000,000 will be spent within the next ten years

The extensions include 300 miles of surface lines and 110 miles of single track for the rapid transit system. This will amount to an increase of 30 per cent in the surface lines system and 56 per cent in the rapid transit system. Subways are included for the central business district, but they will be constructed by the city at its expense. The plans also include the purchase of 1,000 rapid transit cars and 1,000 surface cars or buses.

The present traction fund of $61,250,620 is to be turned over to the city transit fund or utilized in such other manner as the city may provide for the construction of the initial subways. Following this construction the city may, if it wishes, apply the fund to future subways or subway extensions and to certain relatively minor purposes specified in the ordinance. The primary purpose

One of the latest cars of the Chicago Surface Lines, recently put in service

of this fund, however, is the amortization of the capital value of the company and the corresponding reduction in the purchase price at which the city or its permittee may take over the property, and also the corresponding reduction of the investment upon which the just and reasonable return to the company is based under the law as now declared by the state and federal courts.

The city is to have the right to purchase the traction properties at any time upon payment of the company's then unamortized capital value, and may designate a permittee which shall also have the right of purchase, subject to the provision that the permittee shall pay an additional percentage of the capital value if the purchase is made during the first twenty years. The ordinance also contains specific provisions for amortization applicable to special conditions such as the removal of the elevated loop, the sale of real estate or other property, the application of insurance money now used to replace the property insured, and the application of the renewal fund for amortization when property is retired or abandoned and not replaced.

Before the new company can accept the ordinance it must acquire all the properties and rights of the existing street and elevated railroads. The total or aggregate value of these properties is agreed to be, as of Aug. 31, 1929, the sum of $260,442,063, with appropriate adjustment of this value by actual capital additions and deductions to the date of actual acquisition. The company is given the right to purchase these properties subject to certain existing mortgages or liens of the rapid transit company. The reason for this is that there is no effective method by which the Chicago Rapid Transit Company can remove these mortgages or liens except at an unjustifiable cost to the company. They will, therefore, be allowed to run until maturity, when they will be replaced by other securities of the new company subject to the provisions of the ordinance.

The valuation of $260,442,063 was arrived at by adding to the purchase price or capital value of the properties of the surface lines under the provisions of the ordinance of 1907, the present value of the rapid transit system as appraised at the request of the City Council's committee on local transportation. This appraisal was confined to the physical properties; nothing was included for franchise rights or other intangibles. Leading authorities agree that this valuation is fair and is fully in

This intersection at Lake and Wells Streets, the northwest corner of the Loop, is said to be the busiest railroad crossing in the world. In the maximum hour, 224 trains of 1,244 cars pass through it

A daily scene in the rush hour. One of the platforms of the Adams and Wabash Station of the Elevated. Here both tracks run northward

accord with the earlier legislation. To this initial capital value is to be added in the future only the actual expenditures in money for additions to plant and property, as approved from time to time by the transit commission, together with such amounts as the company may supply with the approval of the commission for working capital. In the event of purchase by the city or its permittee, the working capital as well as the properties constituting the system will be required by the purchaser.

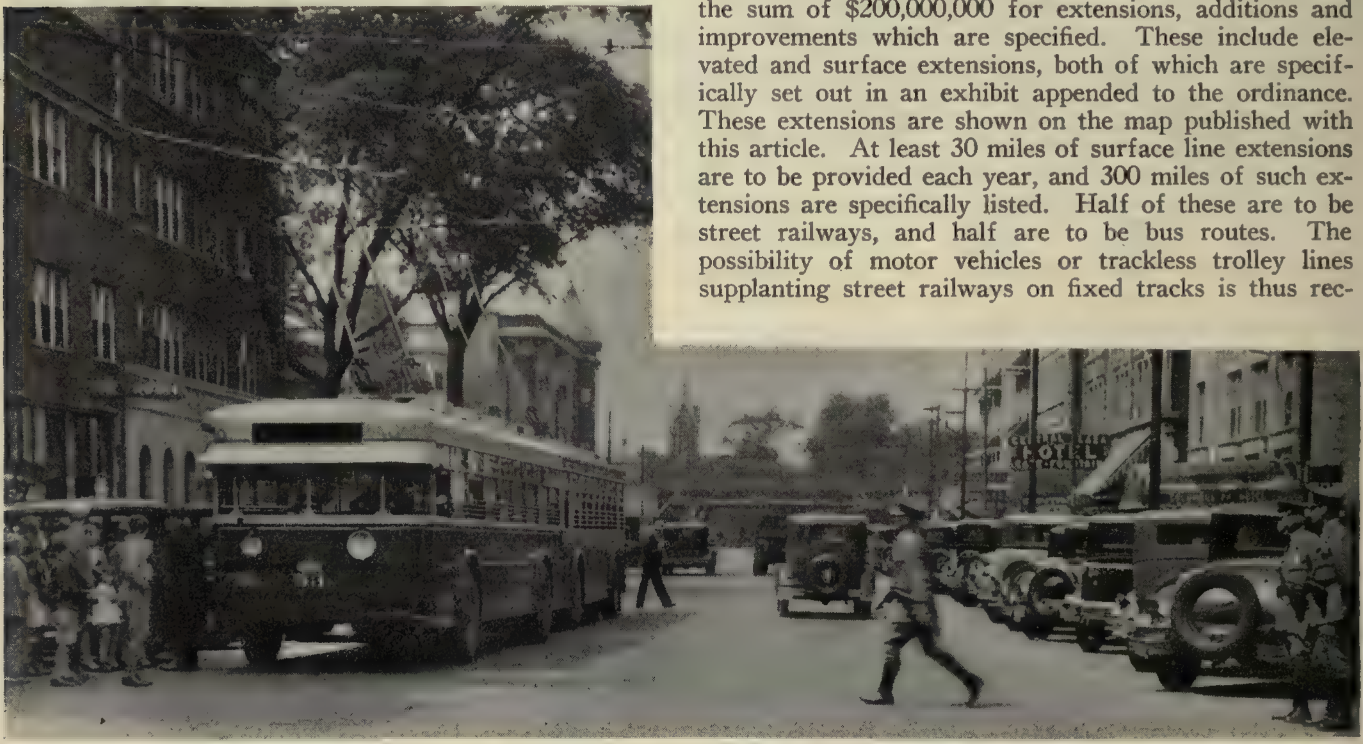
Necessity for rapid transit improvements is recognized in the ordinance, and a certain amount of central subway construction is specifically provided. There is to be a four-track north-and-south subway on State Street from a junction with the present elevated lines at Chicago Avenue to a junction with the present elevated lines near Sixteenth Street. This will immediately relieve the elevated loop and enable it to be utilized for rapid transit facilities primarily serving the west side. An additional subway primarily serving the west side, which includes northwest and southwest, is to be constructed by the city within the ten-year initial construction period. For transfer from one subway to another and between the elevated structures and subways conveniently and without either transfer slips or additional fare, six pedestrian tunnels or passageways are to be constructed. These subways are imperatively needed to accommodate the traveling public which desires to pass to or through the central business district. In addition, elevated lines will be provided, such as the mid-city line, so that those who wish to travel between outlying points can do so quickly and conveniently without passing through the central business district.

Special assessments against benefited properties are recognized in the new ordinance. It provides that the city shall proceed to construct or acquire such subways out of new funds raised by such special assessments as the city may deem necessary and proper, or out of the city transit trust fund, or both. The ordinance states specifically that there is no obligation on the city to raise funds for financing subways by general taxation.

Among the rapid transit extensions listed in Exhibit B, the principal ones are a mid-town trunk line extending along or near Ashland Avenue from 87th Street to the Douglas Park branch; an extension on Milwaukee Avenue to Lawrence Avenue; an extension of the Humboldt Park branch from the present terminus along West North Avenue to Austin Avenue; an extension along Milwaukee Avenue to connect with the

Rapid transit service already has been extended well into the suburbs. This is the Dempster Street terminal of the Niles Center branch new subway; an extension from a connection with the Jackson Park branch in East 63rd Street, along the Illinois Central and the New York Central Lines to a point near the intersection of East 92nd Street and Baltimore Avenue; an extension along South Park Avenue from a connection with the Jackson Park branch in East 63rd Street, along South Park Avenue to 95th Street. The other elevated extensions are principally additional tracks on existing lines and the necessary inclines and structures to connect with city-owned subway structures.

Of the two subways, Route No. 1 will connect with the rapid transit system at a point between West Division Street and West Chicago Avenue, extending along a curve to the east, intersecting West Chicago Avenue near North Franklin Street, thence along West Chicago Avenue to North State Street, thence south along North State Street under the Chicago River to a point near East Sixteenth Street, where it will connect with the elevated structure.



Trolley buses, the latest addition to the Chicago Surface Lines fleet, now serve 40 miles of bus lines

Route No. 2 will connect with the elevated structure near Milwaukee Avenue, extending southeasterly along a curve to a point near West Grand Avenue and Milwaukee Avenue, thence in West Grand Avenue and under the Chicago River to a point near North Dearborn Street, thence south in North Dearborn Street under the Chicago River to a point near West Harrison Street, thence westerly along West Harrison Street under the south branch of the Chicago River to a point near Blue Island Avenue, where it will again connect with the elevated structure. This route may be changed at the option of the city by substituting West Ohio Street for West Grand Avenue, Clark Street for Dearborn Street and Polk Street for Harrison Street. Connecting subways will be provided to connect the two routes.

Not less than 1,000 additional steel or other metal cars of modern design are to be purchased for use on the rapid transit system, and not less than 1,000 additional cars or motor vehicles of modern design are to be provided for surface operation. The present rapid transit system not only will be greatly extended, but the existing plant will be improved. This will include the straightening out of the curves, the reconstruction and extension of structures, the building of new stations and platforms, the installation of escalators where needed and the elevation of the tracks of the Ravenswood branch so as to eliminate grade crossings.

General supervision of service, including extensions, additions and improvements to the new system, is vested by the statutes of Illinois in the Illinois Commerce Commission. That control will pass to the Chicago Transit Commission when such a body is created by the city. In accordance with the enabling act authorizing a terminable permit, the new ordinance requires that the company shall provide and expend, within the first ten years, the sum of $200,000,000 for extensions, additions and improvements which are specified. These include elevated and surface extensions, both of which are specifically set out in an exhibit appended to the ordinance. These extensions are shown on the map published with this article. At least 30 miles of surface line extensions are to be provided each year, and 300 miles of such extensions are specifically listed. Half of these are to be street railways, and half are to be bus routes. The possibility of motor vehicles or trackless trolley lines supplanting street railways on fixed tracks is thus recognized. Under the new ordinance the rapid transit lines in subways and on elevated structures on private right-of-way, free from the congestion of public streets, will form the essential framework of the adequate system of local transportation. The construction of the surface extensions is to proceed concurrently with the construction of the city-owned subways.

Removal of the elevated loop structure is not required, but the ordinance contemplates and provides for its removal in the future, whenever, by the substitution of additional subways or other facilities or the development of the transit system as a whole, the Transit Commission shall, after a hearing, find that the elevated loop structure, or any portion thereof, is no longer required by public convenience and necessity.

Provision is made for the continuance of interurban service to the center of Chicago over the rapid transit lines. The new ordinance authorizes the company to permit the use of its tracks and facilities in the subways by any company now having the right to operate over the tracks of the existing companies under operating agreement. Any future agreement must be approved by the Transit Commission and must not interfere with the passenger service of the new company. Better utilization for local transportation purposes of the existing rights-of-way of steam or electric railways in Chicago and the metropolitan area have long been advocated. A section of the new ordinance expressly authorizes the new company to make operating leases or agreements for this purpose with the approval of the Transit Commission.

Detailed Provisions of the Ordinance

The ordinance as passed contains a great deal of detail and covers all of the subjects which experience has proved necessary. As published by the City Council, it comprises a 43-page folio. While it is impossible here to go into all of the details of the ordinance, the following summarization discusses the more important provisions:

Grant of Authority—The new company is granted authority to establish, construct, reconstruct, maintain and operate a comprehensive, unified local transportation system to consist of the surface lines and rapid transit systems, together with the equipment of subways, motor vehicle lines and additions and extensions thereto. The grant is to continue in force until terminated, as provided in the ordinance.

Termination of Grant—The city reserves the right to purchase the properties of the company upon six months' notice, upon the payment of a sum equal to the capital value of the transit system as fixed by the ordinance. The city also reserves the right to require the company to transfer its property to a designated permittee of the city on the same terms, except for the addition of 10 per cent if the transfer is required within the first ten years, this percentage to decrease one-tenth each year during the subsequent ten-year period. The city at any time may compel the company to comply with the terms of the ordinance through injunction, mandamus, or other appropriate proceedings in any court of competent jurisdiction.

Extensions and Improvements—In the first ten years, designated as the "initial construction period," the company is to acquire funds from the sale of securities and construct the extensions designated in Exhibit B of the ordinance. The total cost of these improvements during this period is estimated at not less than $200,000,000. During the first three years succeeding the effective date of the ordinance the company is to provide not less than $65,000,000 of this total amount for extensions and improvements. If the company fails to build the extensions, interest or dividends will not be paid either on any securities or stocks which are junior to the 3 per cent compensation paid for the use of public property, or on common stock, which, in the initial financial set-up of the bankers, represents $77,000,000 of the capital value, and this income would be applied to the building of any extensions, thus making good the default of the company. The company assumes the obligation of rendering local transportation service within the territory in all subsequent periods which the local transit commission, after hearings, shall find to be required by public convenience and necessity. It shall construct or acquire such additional extensions and additions authorized by the city and ordered by the local transit commission, after hearing.

Subways—The city agrees to construct the subways, shown in Exhibit C of the ordinance, during the initial ten-year period, the construction to be financed by special assessments levied only on properties directly benefited and from the city transit trust fund. Subsequent to the ten-year period additional subways will be built by the city in the same way. The company is obligated to equip and maintain the subways and use them as a part of the rapid transit system.

Rates of Fare—Rates of fare on the surface and elevated lines will remain the same as at present until changed by the local transit commission. Free transfers will be granted from the elevated lines to the surface lines, but a charge of 3 cents will be made for transfers from the surface lines to the elevated lines. Universal transfer privileges are provided for a continuous ride using the rapid transit lines, the surface lines or a combination, if the appropriate fare has been paid. The company is required to designate convenient and appropriate transfer points between rapid transit and surface lines, and additional transfer points may be required by the local transit commission. Employees of the company, city policemen, firemen and health department employees, when in full uniform, may ride free, and special provisions are made for letter carriers.

Paving and Clearing Away Snow—The company is required to pave the right-of-way in all paved streets occupied by its tracks, except where the city designates such an area as a parkway. All pavement on rights-of-way shall be maintained by the company. The company at its own cost must keep clear of snow the portion of the streets occupied by its tracks and provide a traffic lane on each side of its tracks, in so far as practicable. The city maintains the right to have snow, street sweepings, garbage or other street refuse transported at night on the surface lines if it so desires.

Maintenance of Property—The company is required to maintain the system in first-class operating condition. A fund representing 7 per cent of the gross receipts is to be set aside for renewal, depreciation and obsolescence. The company also is required to create a fund of 2½ per cent of its gross receipts as a damage reserve fund. The local transit commission may enter orders from time to time increasing or decreasing the per cent appropriated so that funds may be adequate to meet the needs.

Compensation to the City—The company will pay into the city transit trust fund 3 per cent of its annual gross receipts as compensation for the use of public property. For the administration of this fund the Mayor will appoint a Chicago, state or national bank or trust company, with a capital stock and surplus of at least $2,000,000, as trustee. The present city traction fund will be transferred to this new city transit trust fund within 30 days after the ordinance becomes effective.

Use of City Transit Trust Fund—Money from the fund may be used for the following purposes:

1. To pay the salaries of the Chicago Transit Commission.
2. Compensation of the trustee.
3. The sums authorized by the City Council to meet the cost of the construction of subways provided in Section 9.
4. The sums authorized by the City Council "to pay expenses of the city in connection with the protection of the rights of the city or the enforcement of the company's duties and obligations under this ordinance."
5. Sums required for the cost of renewal or replacement of any destroyed portions of the subway.
6. The cost of the city's share of relocating company's tracks, as ordered by the transit commission.
7. The cost of any additional subways, and the sums required to complete the final purchase of the property of the company.

Employee Pensions—The company must establish and maintain a pension system upon such terms as the company and its employees may agree, subject to the approval of the local transit commission. Reasonable life and health insurance for employees also must be provided out of the operating expenses of the system.

Value of Properties—The value of the properties of the surface lines and rapid transit company as of Aug. 31, 1929, is agreed to be $260,442,063.82, "to which may be added such amount as the Illinois Commerce Commission may approve to meet the working capital requirements of the company." It is agreed that this sum will be augmented by additions to capital value and from it will be subtracted deductions in capital value, made between Aug. 31, 1929, and the effective date of the ordinance, and the total thus obtained shall be the initial capital value. Subsequent additions to the initial capital value must be approved by the local transit commission, and this initial capital value, plus all additions and less all deductions or reductions of capital value, shall constitute the true capital value of the company's property, which will be taken as the actual net investment of the company in determining the basis for fixing rates of fare and return to the company. Additions to the capital account are confined to actual expenditures for new additions.

Return to the Company—It is agreed that the company is entitled to, and shall receive, a just and reasonable return, to be fixed from time to time by order of the local transit commission. If the corporate income of the company in any fiscal year is in excess of the return so fixed, the excess will be paid into the city transit trust fund as additional compensation to the city.

Approval of the Ordinance—The ordinance will not be in full force unless:

1. It be approved at the referendum vote on July 1, 1930.
2. The Illinois Commerce Commission authorizes the purchase of the properties and the issuance of securities as provided in the ordinance.
3. The company accepts within 120 days after the referendum.

There are four exhibits which are part of the ordinance. Exhibit A lists the properties of the surface and rapid transit lines now owned which are to be acquired by the new company. Exhibit B lists the extensions and additions provided for the initial ten-year period. These are shown in the map published with this article. Exhibit C provides the routes of the proposed subway structures. Exhibit D lists the bonds of the Chicago Rapid Transit Company which will continue as liens until maturity.

C.E.R.A. Analyzes Condition of the Industry

IN VIEW of the serious decline in riding and revenue accompanying the present business depression, the Central Electric Railway Association, which convened at Cedar Point, Ohio, on July 17 and 18, devoted a major part of its program to a discussion and analysis of the situation. It was the general opinion of the body that although the depression had caused great losses to all transportation companies and an immediate upturn could not be expected, the economy measures instituted and service adjustments made to offset these declines would yield increasing and continuing benefits to the railways with a return to normalcy. The trolley bus, taxation and modern braking were other subjects presented.

The meetings were conducted under the chairmanship of the association president, L. G. Tighe. In his opening address Mr. Tighe commented on the present condition of the industry and summarized the replies to a letter sent to several member companies to gain a cross-section of the industry's status. With the exception of two, all the companies reported serious falling off in passenger and freight revenue and unfavorable industrial conditions in their territories. The replies revealed, however, the many steps being taken to hold up the net. Increasing speed, improving equipment, rearranging routes, eliminating stops, abandoning unprofitable lines, adjusting fare schedules, affecting all economies possible, merchandising rides, giving pick-up and delivery freight service and making the service generally more attractive are some of the activities Mr. Tighe reported.

"Look beyond the present" was the counsel of G. C. Hecker, general secretary American Electric Railway Association, in his address on the general situation of the industry and the San Francisco convention high spots. In spite of all the adverse figures, he related, optimism prevailed at the Coast meeting. This was prompted by the general feeling that an upturn would be witnessed in the fall, and by the progressive moves being made to develop new cars, secure adequate fares and meet the competition of the private automobile. Mr. Hecker told of the Presidents' Conference plan, announced at the convention, the purpose of the organization and its plan of attacking the problem. He stated that progress necessarily would be slow and added that companies should not defer car purchases.

Another encouraging factor, the speaker pointed out, is the rapid approach of the private automobile to its saturation point. Leaders of the automotive industry expect a stabilization in the manufacture of their product very soon, a condition which will have a vital influence on the electric railway riding habit. In the meantime, Mr. Hecker added, the railways should give the most in speed, comfort and convenience to approach automotive service.

The speaker commented on the wide variation in maintenance costs, the opportunities for interchange of ideas and the adoption of new practices, the problems facing the small cities and the development of freight business.

The convention was addressed next by W. J. Clardy, Westinghouse Electric & Manufacturing Company, who spoke on the trolley bus. "A new form of successful transportation without rails," he stated, "has been introduced by the modern trolley bus. This vehicle is permitting the economic expansion of the field of street railway business and is a much-needed tool for increasing transportation revenues. It offers a means of providing service in smaller cities or extending into new territory in larger cities, with a reasonable investment and low operating cost. The outstanding factor in favor of the trolley bus is that its application has resulted in increased gross receipts. It appeals to both the public and operating men."

The subject was discussed also by C. A. Burleson, General Electric Company; L. M. Zapp, Eastern Michigan Railways; G. C. Hecker, A.E.R.A.; R. N. Graham, Penn-Ohio System, and Ross Schram, Twin Coach Corporation.

"Transportation and the Finest Motive in the World," was the subject of an address at the second session by Allan Rogers, supervisor public relations New York Central Lines. Mr. Rogers commented on the essentiality of the industry and stated that the public really is interested in transportation. Enthusiasm, according to the speaker, is the greatest need of both the steam railroads and electric railways to forge ahead. "Have faith in your industry and confidence in yourself," was the counsel added. Mr. Rogers urged the development of new business and spoke at some length on "taxation without due compensation."

Following Mr. Rogers' address a paper was presented by G. L. Cotter, engineer Westinghouse Traction Brake Company, on "Modern Braking of Electric Railway Cars." "Traffic density during the past few years," Mr. Cotter stated, "has seriously affected average schedule speeds of street railway cars. Inability to start and stop as quickly as other vehicles has caused a slowing down to permit safe operation. This can be remedied, however, by improving the car brakes. The more nearly the street car approaches the stopping ability of the automobile, the better it is prepared to hold its place in the traffic stream. By modernizing the brake equipment the stopping distance can be decreased 40 to 50 per cent.

"Since there are thousands of old cars in service, a great improvement in average braking performance on any railway can be obtained by modernizing the equipment. This involves, first, the reduction of time of application and release from the three to five second rate to the recent standard of one second or less, and second, bringing the braking force nearer the point of wheel sliding than has been the practice."

The convention was concluded with an interesting symposium on "What's Ahead for the Industry." Those who participated were: Charles H. Jones, Chicago, South Shore & South Bend Railroad; R. R. Smith, Northern Indiana Railways, Inc.; H. A. Nicholl, Union Traction Company of Indiana; L. M. Brown, Interstate Public Service Company; R. N. Graham, Penn-Ohio System; Claude L. Van Auken, *Electric Traction*; Clifford A. Faust, ELECTRIC RAILWAY JOURNAL; L. M. Zapp, Eastern Michigan Railways; T. A. Ferneding, Dayton-Xenia Railway; W. S. Rodger, Eastern Michigan Railways; G. C. Hecker, A.E.R.A.; W. H. Beattys, Westinghouse Electric & Manufacturing Company; James H. Drew, Ohio Brass Company, and R. H. Palmer, Westinghouse Electric & Manufacturing Company.

Maintenance train used on the overhead system of the New Haven's main line

Maintaining the DISTRIBUTION SYSTEM *of an Electrified Railroad*

By B. F. BARDO

Superintendent of Electric Transmission,
New York, New Haven & Hartford Railroad

Reliability is considered of the greatest importance on the New Haven Railroad's electrified division. Particular precautions are taken to eliminate defects in the power distribution system before they may cause interruptions to train service

RELIABILITY that is required in railroad service is of such a high degree that everything must be done to put the distribution plant of an electrified system in the best shape possible and to keep it so. Electric motive power is helpless without a supply of energy.

The electrification of the New Haven Railroad, while not the largest in this country from the standpoint of route-miles, is perhaps the most comprehensive one in the United States at the present time. In round numbers, the company owns 583 miles of electrified track, distributed as shown in Table I. The location of lines and the dates of electrification are given in one of the accompanying diagrams.

The contact and feeder wires have a voltage of 22,000 between them, with 11,000 volts from each to the rail return. As a rule, both the feeder and contact wires are supported from the same structures, which are of steel and spaced a nominal distance of 300 ft. apart. On all except the New Canaan and Danbury branches the feeder system is in duplicate, two No. 0000 wires being on each side of the right-of-way.

Power for signals is carried on duplicate single-phase, two-wire No. 00 circuits. Most of these operate at 11,000 volts, although those west of New Rochelle and on the New Canaan branch carry 2,300 volts. Duplicate single-phase one-wire No. 00 circuits at 11,000 volts carry power for circuit breaker control between Harlem River, Woodlawn and New Haven. Between South Norwalk and New Rochelle there are also two three-phase, three-wire 11,000-volt No. 0000 circuits, and between New Rochelle and Oak Point similar circuits, but of No. 00 wire. Throughout the electrified territory low-voltage multiple conductor signal cables are suspended by steel messengers from the main supporting

Table I—Mileage of New Haven Railroad with Electrified Contact System

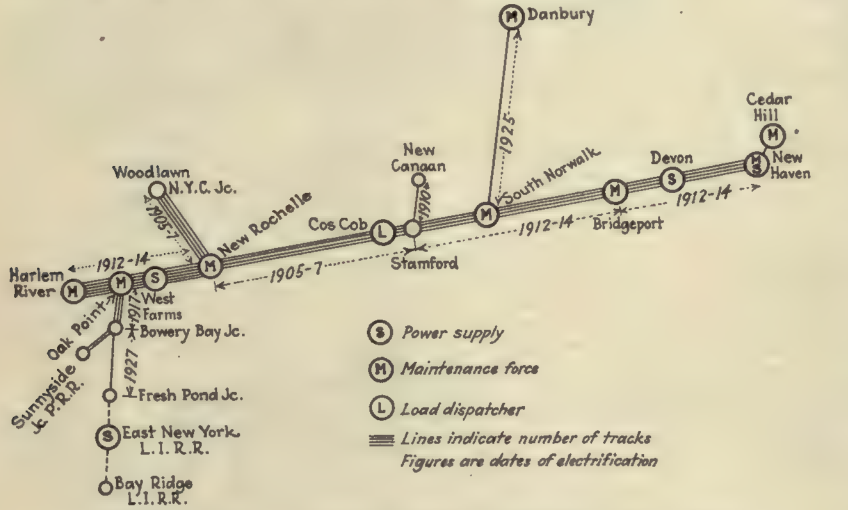
	Route-Miles	Track-Miles
Main line, four track	62	248
Branch line, six track	12	72
Branch line, four track	4	16
Branch line, two track	5	10
Branch line, single track	42	42
Yards (track miles)	195	195

Table II—Classification of Feeder System on New Haven Electrified Section

	Miles
Four traction feeders, single phase, one wire	81
One traction feeder, single phase, one wire	24
Two power feeders, three phase, three wire	69
Two signal feeders, single phase, two wire	66
One signal feeder, single phase, two wire	12
One signal power cable, two and four wire	12
Two control feeders, single phase, one wire	75

structures. The different types of circuits and mileages are shown in Table II.

Contact and feeder systems are sectionalized at 26 points, most of which are interlocking signal stations. More than 700 oil circuit breakers are involved, all remotely controlled and practically all automatic. There are about the same number of disconnecting switches. All of the oil breakers and about half of the disconnecting switches are under the control of the load dispatchers.



Schematic diagram of the New Haven's electrified system, showing locations of power supply, maintenance forces and load dispatchers

Power Generated and Also Purchased

The principal source of power is the company's steam station at Cos Cob, Conn. Supplementary supplies are obtained from the United Electric Light & Power Company through a joint substation at West Farms, N. Y., and the Connecticut Light & Power Company at Devon, Conn. Emergency connections of limited capacity are maintained to the Connecticut Company at New Haven and the Long Island Railroad at East New York.

The normal daily traffic includes 264 passenger trains on both main and branch lines, and an average of about 37 freight trains. In addition there are the usual work trains and light engine movements. All yards, both freight and passenger, west of Stamford are operated entirely by electric switchers. East of Stamford both steam and electric switching is employed.

Operation, maintenance and construction of the entire distribution system are handled by an organization which is shown in detail in the accompanying chart. Besides the general officers, two general foremen are in charge of all maintenance and construction in the territory east and west of Stamford respectively. The chief load dispatcher and his assistants are located at Cos Cob.

Each fall a close-up inspection of the entire catenary and contact system is made. Each spring a similar inspection is made at interlocking plants and also where the service is known to be sereve. Trains are used from the tops of which the inspection is made. The various items requiring attention are recorded and later are used to form a work list for each individual electric section.

The indicated maintenance items are done in order of their importance with a view of preventing a plant failure. If maintenance items of a similar nature occur in any quantity they are programmed and the material prepared in advance. Sometimes special facilities must be employed to be sure to get the work done before difficulties arise. It is far simpler to schedule, say, a 30-minute maintenance job in the middle of relatively dense service than to run the risk of a plant failure at an unknown time with repairs which may take hours. As a result there are but few preventable failures.

Each summer a survey is made of the entire electric zone to determine the height of the contact wire above the rail under each overhead highway bridge. All locations lower than 16 ft. are inspected to ascertain what must be done to increase the clearance to that value. The distance from contact wire to rail tends to decrease due to several causes, the more important of which are: (1) Slack catenary messengers or trolley or overlong hangers; (2) raising the rail more or less unconsciously during track tamping; (3) replacing rail and tie plates with new material of greater over-all height.

The results of the clearance survey are kept for reference when a question is raised as to the possibility of moving an over-dimension car. A published permissible height for cars may be 15 ft. 7 in., based on a nominal limiting clearance between contact wire and rail of 16 ft. Over-dimension cars may be routed from one track to another, or even handled under dead wire if that appears better than reloading.

Besides general annual inspections there are intermediate schedule inspections of special parts.

During the five-year period 1925-1929 the time of our maintenance trains was distributed as shown in Table III. Ordinarily these trains are manned by one foreman and three linemen. We have tried to make the train equipment as complete as possible: The trains have been designed for speed in doing the work, because that actually makes the time more productive. They operate both day and night and are electrically lighted, the equipment including floodlights and one portable 6-volt storage battery lamp. The elevating platform of the tower car is operated by a compressed air motor. Compressed air is also used for operating wrenches and for drilling. Each train is equipped with a forge, drill press, rod shear, automatic die heads for threading rods up to ½ in., and other small tools. Oyxacetylene cutting and weld-

Table III—Distribution of Time of Maintenance Trains on New Haven Electrified System, in Hours

	1925	1926	1927	1928	1929
Total time	14,720	17,374	17,497	17,778	15,573
Delay for causes beyond control*	6,471	8,119	7,378	6,654	6,531
Traveling	3,183	3,372	3,414	3,847	3,296
Time on maintenance work	4,488	4,868	5,373	5,575	3,399
Time on construction work	578	1,015	1,332	1,702	2,347
Total work	5,066	5,883	6,705	7,277	5,746

*Includes transportation delay, waiting for engine on cars and time held in yards or sidings clearing superior trains.

ing equipment is carried. We also are experimenting with a compressed air operated pay-out and pick-up reel holding about 5,000 ft. of two-conductor, rubber-insulated cable, by means of which our train can keep in touch by telephone with the load dispatcher.

In the yards and on the branch lines the basis of maintenance effort is the periodic inspection. In the four major yards the personnel consists of an emergency foreman with a lineman and a helper on the day trick, supplemented by an electric switch operator on each of the other two tricks. The Danbury branch has a crew similar to that used in yards on the day trick. At the Oak Point and Cedar Hill yards and on the Danbury branch a gas rail-and-tower car combination, as shown in one of the illustrations is used. This equipment covers the ground readily and provides a well-equipped point from which to work.

Substation or anchor bridge maintenance includes all inspection and repair work on breakers, disconnecting switches, transformers, control cables, switchboards and other equipment at sectionalizing points. In the inspections every attempt is made to ferret out faulty conditions before failures occur. Oil circuit breakers are inspected internally after closing once on a short circuit, or after opening six times under short circuit conditions. Exceptions are the circuit breakers on stub-end circuits, which are inspected after each operation under short circuit conditions. An individual card for each piece of major substation equipment carries a brief record of the inspection and maintenance of that piece.

Insulating oil in large transformers is sampled every six months. If the average of three samples from the bottom of any tank fails to exceed the minimum breakdown limit, two to four barrels are drawn off from the bottom, a like amount of new oil added, and another test made. Every two years the oil is filtered by a portable centrifuge. Circuit-breaker oil is changed every two years unless more frequent replacement is necessary on account of operating developments. The bus supporting and other pin and suspension insulators at all anchor bridges are tested annually by a standard device, and defective ones scheduled for replacement. Operation of all relays is checked twice yearly.

Safety Methods Are Stressed

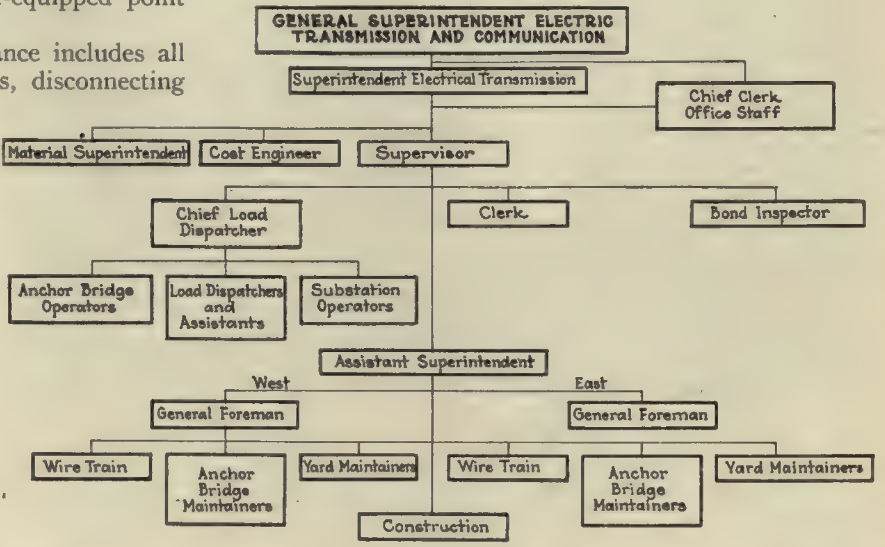
Safety of employees is given considerable attention. No work is done on wires of the traction distribution system until they are de-energized and grounded, usually at two or more points. Each employee must pass an examination on the more important of the safety rules. In addition safety officers must qualify on certain fundamental rules of the operating department.

Practices known to be safe are developed in detail and the forces are instructed in their use. Cards are used for reporting practices or conditions which are considered unsafe. These are referred for correction to the department involved, and are made the subject of comment at the regular monthly safety committee meeting, of which the general superintendent of electric transmission and communication is chairman and most of the supervising officials are members. In addition, all accidents are analyzed.

Besides these meetings, other monthly meetings, lasting about one hour, are held by field forces. At these meetings safety rules, accident analyses and first-aid work are handled. Since 1928 a course in first aid has been available. A number of the department employees hold Red Cross certificates.

Method of System Operation Standardized

Operation of the distribution system, which handles about 200,000,000 kw.-hr. per year, differs from that of a power company principally in that the system is broken up into very much smaller parts. The chief load dispatcher at Cos Cob is assisted by four load dispatchers and two assistant load dispatchers covering the 24-hour period. The two principal duties of the load dispatchers are: (1) Isolation of faults, and (2) procuring track, feeder or other circuits for maintenance and construction forces in co-operation with operating department officials.



The organization of the electric transmission department of the New Haven Railroad

In the isolation of faults the load dispatchers are assisted principally by reports from signal station operators, who control all sectionalizing breakers. A fault or ground is cleared by the automatic opening of circuit breakers at adjacent signal stations. The operators report immediately by selector type telephone to the load dispatcher, who proceeds to energize those circuits which do not appear to be directly involved. In general, it is the practice to close main line and yard traction circuit breakers directly on the fault, but this is usually done immediately and only once. Faulty traction circuits are left de-energized if reports to the load dispatcher disclose clearly the nature of the trouble. Faulty feeder circuits usually are left open until after an inspection to locate the difficulty. Fautly traction circuits on the single-track New Canaan and Danbury branches normally are tested once. If they do not show clear they are left de-energized until a member of a train crew reports. The load dispatcher instructs the crews to drop the pantographs, after which the circuit is tested again. If the branch then shows clear, the inference is that there was difficulty with the locomotive and the crew is informed accordingly. If no trains are on such single-track branches additional tests may be made at the option of the load dispatcher, but an inspection is always ordered as soon as possible.

Maintenance and construction forces inform the load dispatcher as to the extent of the circuits or equipment they require, and for how long. When traction circuits are involved the load dispatcher consults the train dispatcher. After mutual agreement has been reached the load dispatcher has the necessary circuits de-energized and so informs the foreman or assistant foreman of the gang involved. The foreman enters the time and the description of the circuit or circuits in his log book and has them grounded for protection. He gives each man who is to work on or near them a copy of the log or clearance slip. When the work is finished the log slips are taken back, the protective grounds removed, and the circuit or circuits turned back to the load dispatcher.

In the yards and on the branch lines gas rail tower cars are used

When employees of other departments or outside contractors have much work to do for which circuits of one kind or another must be de-energized and grounded, an employee familiar with the system is assigned to prescribe safe working space and to procure and ground such circuits as may be necessary.

Besides their principal duties load dispatchers have several others. All remote controlled circuit breakers are daily put through a complete cycle of operation, usually during the early part of the second trick. If any circuit breakers misbehave, repairmen are then available to fix them. On days of special traffic, such as football days or those preceding holidays, this test is omitted. Once every 24 hours the load dispatcher requests each signal station operator to inspect his switchboard and report all open circuit breakers. This check catches any breakers which are open or closed incorrectly.

Interference with radio reception is a source of little difficulty with us, although any arcing contacts usually will affect nearby reception. Fuses, disconnecting switches, poorly fitted catenary hardware and devices for feeding the draw span of bridges cause practically all of the difficulty. A small radio head set in the load dispatcher's tower is used to indicate trouble. A portable test receiver is used by the bond inspector to locate difficulties not readily apparent. A complete record is kept of every radio reception complaint investigated.

Table IV—Total Number of Grounds and Preventable Defects on New Haven Electrified System, 1925–1929

Cause	1925	1926	1927	1928	1929
Distribution system.........	502	425	322	248	209
Other known causes.........	1,358	1,361	1,312	1,032	830
Unknown and unclassified....	568	743	600	488	371
Total....................	2,428	2,529	2,234	1,768	1,410
Preventable defects....	Not recorded	201	166	108	89

Firemen who are fighting fires contiguous to, or on, the right-of-way must be protected. The fire departments of all communities served by the electrified section have been informed on whom to call if the fire requires de-energizing of wires. In the event of a call of this kind it may be necessary to de-energize all wires by the scene of the fire for a short period. Responsible officers of the operating or distribution departments are hurried to the scene of the fire to take steps for restoring normal service.

To assist in clearing up after wrecks or other emergencies, a car of wood poles and a framed wood bent is kept available at New Rochelle. At Bridgeport and New Rochelle two circuit breakers are held completely assembled ready for immediate use. There is also a section of control switchboard with the usual equipment ready for wiring, and operating circuit breakers. A spare 2,000-kva. balancing transformer is kept on a special car at New Rochelle, with equipment for installing it quickly. Spare small transformers and other equipment are available at both New Rochelle and Bridgeport.

The total number of grounds and preventable defects for the latest five-year period available is given in Table IV. This table sets forth grounds as differentiated from faults. For instance, an insulator, particularly of the wood strain type, may flash over a number of times before definitely failing. There is only one fault but a number of grounds. Every fault is investigated so that it may be properly classified as between preventable and otherwise, and that so far as possible steps may be taken to prevent a recurrence.

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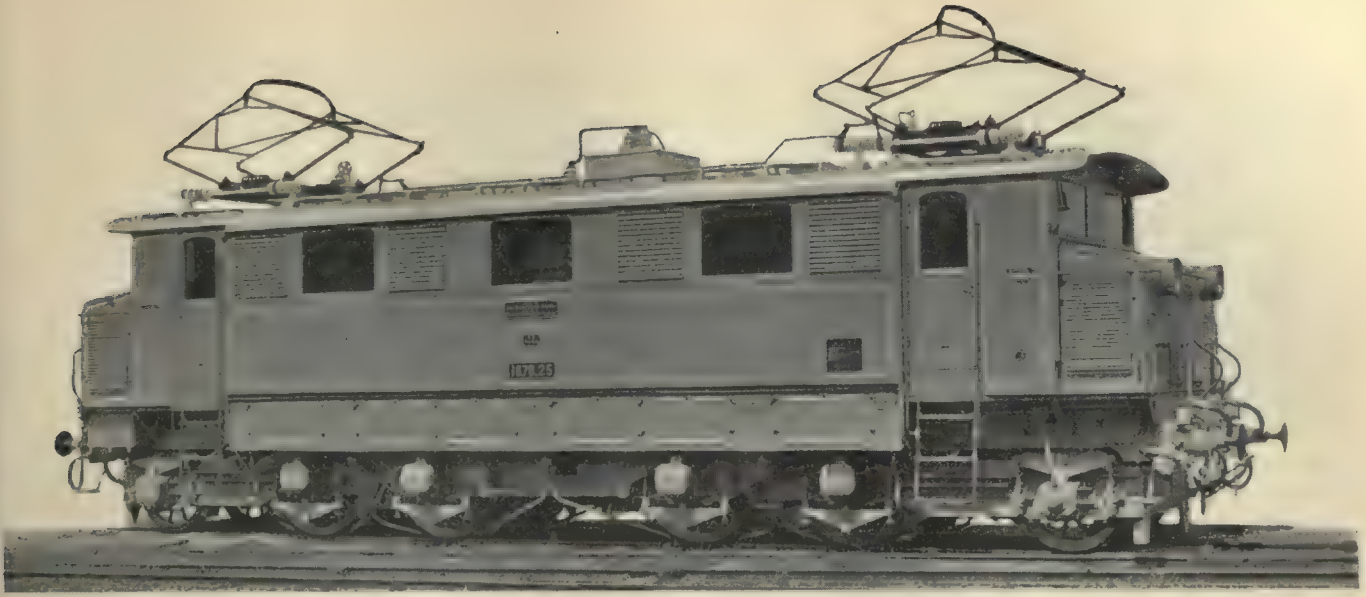
Commercial Frequency for Single-Phase Road

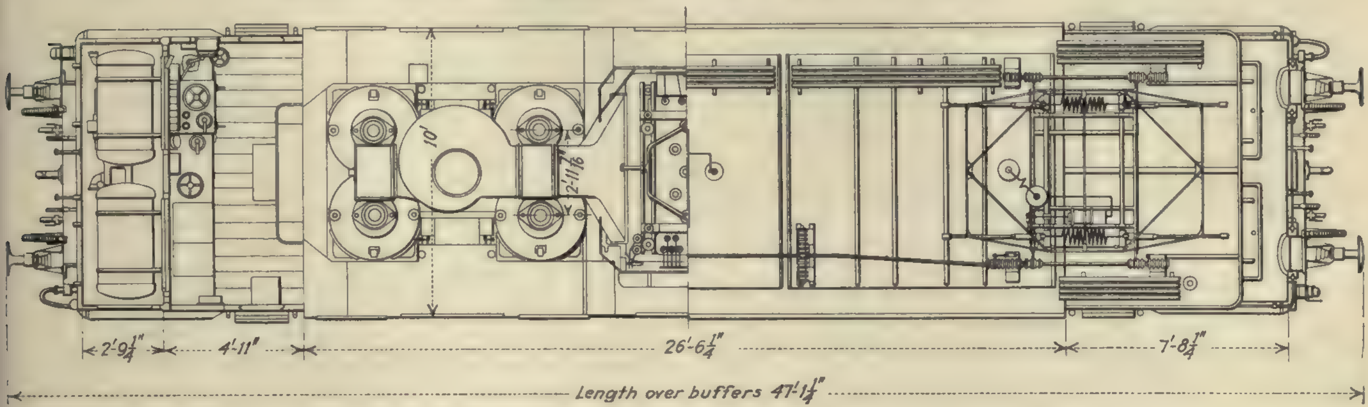
EXPERIMENTS are being made in Germany with single-phase current of commercial frequency for railway service. Two locomotives have been built and are being tried on an industrial railroad, according to *Elektrotechnische Zeitschrift*. The locomotives are capable of starting a train of 1,400 tons 60 times an hour in either direction, with control no more difficult to operate than that of a direct-current locomotive.

The power is developed from single-phase compensated motors in conjunction with three-phase motors. On the first control step the single-phase motor is connected in cascade with a three-phase motor of the same number of poles. For reversing, advantage is taken of the characteristic of the induction motor whereby it turns in the direction of the rotating field when fed through the stator and opposed when fed through the rotor.

For starting, the converter is started first to supply direct-current for excitation of an intermediate rotor. When this attains synchronism the locomotive is ready to start. The control is actuated with direct current converted on the locomotive.



One of the new Austrian Federal Railways locomotives with vertical twin motors



The twin motors drive individual axles. As they are within the cab they are readily accessible

Vertical Motors Feature Austrian Locomotives

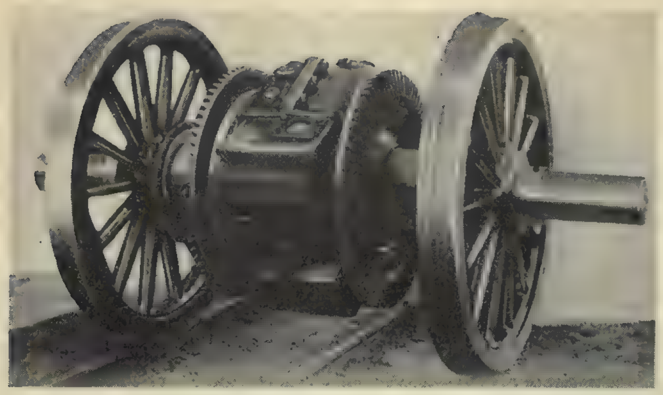
Built for high-speed passenger service, twin motors drive individual axles through bevel gears

LOCOMOTIVE drive of a type differing radically from that in use in America has been found successful on the lines of the Austrian Federal Railways. The principal feature is the use of vertical motors connected to the driving axles through bevel gears. The drive is somewhat similar to that brought out a short time previously by the Midi Railway of France.

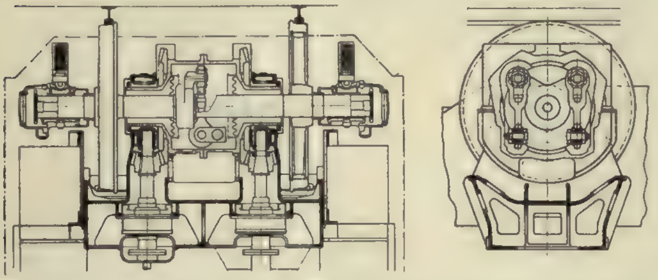
At first, the Austrian Federal Railways bought four locomotives of the vertical type. These had four driving axles, with a motor mounted above each. The satisfactory performance prompted the railway to adopt a similar design for use in high-speed passenger service on the Innsbruck-Salzburg division of the main line. This section has grades up to 2.5 per cent and curves with a minimum radius of 225 meters (75 ft.), over which trains of 360 tons are hauled at speeds of about 70 km. (42 miles) per hour. Since it was desired to run the trains through without change of motive power and to attain the highest schedule possible, it was deemed advisable to increase the rating.

Both types of locomotives have the same general arrangement of parts. The new type, of which 29 are now in service, differs from the earlier design principally in having twin motors geared to each axle. Each axle carries a quill which is flexibly mounted through links. At each end is a bevel gear, held in a fixed position with respect to the motor and the locomotive frame. The driving mechanism is completely housed in a drum-shaped casing.

The flexible links between quill and axle are carried inside the drum. Two guiding rods are linked on one side to two arms on a short shaft carried in bearings within the drum, the other ends of the rods being connected to two crankpins mounted on arms projecting



Assembly of a driving axle showing the inclosed flexible links and the twin bevel gears



Detail of the flexible drive. The double-link connection permits of considerable motion between wheels and body of the locomotive

from the driving axle. Ball joints at either end of the rods provide full flexibility in every direction between the driving wheels and the spring-supported unit of body, motors and quills.

The bevel gears are of the helical type, and are said to be extremely smooth and quiet in action. There is a twin-step bearing on each motor shaft to absorb the vertical thrust.

Location of the motors within the cab makes the commutators and brushes accessible even when the locomotive is in motion. The high center of gravity gives good riding qualities at high speeds. The available lateral play of the drivers permits the use of a leading truck at either end of the locomotive, with one idle axle and one driving axle. With the low unsprung weight and small-diameter wheels, the wheelbase was made short, and easy guiding over the sharp curves on the mountain division was made possible.

The principal reason for the change from the single motor to the twin motor design was the need for an increased output. The twin motors weigh only slightly more than a single motor. Due to the smaller armature diameter, the rotating masses are smaller and the inertia effect is reduced, making acceleration and retardation easier. The gyratory effect in each group is compensated by having the motors equally spaced about the center line.

The motors are connected permanently in series. It has been suggested that the same locomotive design can be adopted for freight service with the motors connected for half speed, although this has not been done as yet.

Following are the specifications of the locomotives:

Specifications of High-Speed Locomotives of Austrian Federal Railway

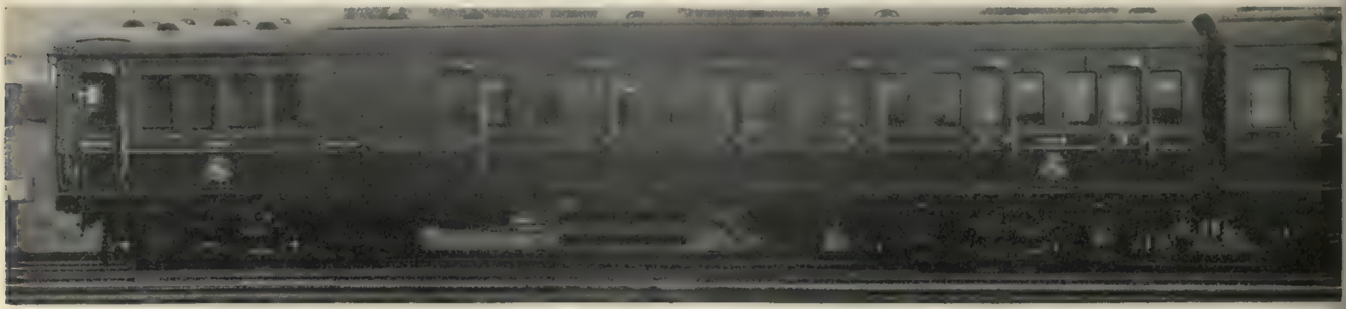
	Series 1570	Series 1670
Electric system	Single-phase, 15,000 volts, 16⅔ cycles	
Number of units	4	29
Diameter of drivers, in.	53¼	53¼
Wheelbase, ft.-in.	36–2	36–2
Length between buffers, ft.-in.	46–0	47–2
Number of motors	4	8
Motor voltage	385	385
Gear ratio	1:3.82	1:3.82
Continuous transformer output, kva	1,550	2,840
Continuous locomotive output, kw	1,270	2,200
One-hour locomotive output, kw	1,650	2,440
Speed at continuous rating, m.p.h.	41	45
Speed at one-hour rating, m.p.h.	35	41
Maximum safe speed, m.p.h.	53	67
Tractive effort at starting, lb.	37,500	42,000
Weight, mechanical equipment, tons	57.2	56.7
Weight, electrical equipment, tons	44.0	49.0
Weight total, tons	101.2	105.7

British Subway Tries Roller Bearings

ROLLER bearings on electric cars have just been put into service by the Metropolitan Railway, of London. This is the first use of bearings of this type on electric trains in the United Kingdom. If they prove satisfactory, as seems likely, they are to become standard equipment on this subway.

The roller-bearing axle boxes and motors of these trains are the result of intensive research, and constitute a radical departure from conventional design. They give promise of substantial economies, together with greater mechanical efficiency, smoother running and quicker acceleration. Attention to lubrication is said to be necessary only about once a year. The reduction in train resistance will, it is hoped, lower the demand for electrical energy on starting, give increased speed without involving the risk of hot bearings, and also permit the introduction of heavier trains.

It is not without interest that the company is returning to the compartment type of coach, which it now regards as affording the speediest method of discharging and loading passengers.



Compartment type coach of Metropolitan Railway of London equipped with roller bearings

Bonus Plan Works Well

on New York & Queens County Railway

Receipts have been increased, accidents have been reduced and employment has been stabilized since employees have shared in earnings

BONUSES for certain classes of employees, based upon earnings, have contributed measurably toward the successful operation of the New York & Queens County Railway during the past seven years. When Gen. Lincoln C. Andrews assumed control of the property, in 1923, the receipts of the company were the lowest per car-mile of any of the street railways in the New York metropolitan area, averaging just over 29 cents. Setting a quota of 31 cents per car-mile, the management agreed that for every cent per mile which the property should earn above this figure, certain of the employees should have their base rate of pay increased 1 cent per hour. Those participating include all platform men and supervisors, all employees of the shops and mechanical department excepting the superintendents, all employees of the line department, and all substation employees. Trackmen are not included because the track force is a seasonal one and few of the men employed in this capacity remain with the company for more than a few months at a time.

To be eligible, an employee of the transportation department must work at least 150 hours each month. In order to stimulate interest in safety and to reduce accident expenditures, it has been further provided that trainmen involved in accidents for which they are at fault shall lose their bonus for the month. Shop employees responsible for poor maintenance resulting in pull-ins, etc., may also be penalized in this way at the discretion of the management.

From the very inception of the plan receipts began to exceed the figure of 31 cents per car-mile, making the bonus plan operative at once, and this continued with only one break until August, 1924. During the latter part of 1924 and the first half of 1925 receipts fell below the quota figure and no bonus was paid. When the company sought, and obtained, an increase in fare from 5 cents to 6 cents, effective in July, 1924, the basis of the bonus was raised to 37 cents per car-mile. Receipts have run above this figure continuously for the last 52 months, reaching a maximum of 46.75 cents per mile, as shown in the accompanying table.

When the Interborough Rapid Transit subway was extended to Flushing in 1928, it was thought that the receipts of the New York & Queens County Railway would suffer a severe decline, but the rapid development of the community has prevented this. Certain unprofitable lines were abandoned and service on others was reduced, with the result that neither receipts per car-mile nor the gross receipts of the company have suffered to any extent.

Under the original plan, the money earned in the form of a bonus was made available and was included in each payroll, being based upon the earnings of the previous month. Effective Jan. 1, 1929, however, the plan was altered so as to permit men to leave the bonus on deposit in a savings bank to be paid in a lump sum, plus 4½ per cent interest, at the end of the year. It was also provided that those choosing to do so could have the bonus paid monthly as had previously been the practice.

Monthly Bonus Payments, in Cents per Car-Mile, by New York & Queens County Railway

	1923	1924	1925	1926	1927	1928	1929	1930
January....	.....	0.013	.....	.....	0.0450	0.0425	0.0375	0.0425
February...	.....	.008	.....	.....	.0400	.0375	.0350	0.450
March.....	.....	.....	.....	0.007	.0370	.0475	.0525	.0375
April.......	.....	.016	.....	.011	.0500	.0500	.0625	.0500
May.......	.....	.025	.....	.026	.0690	.0625	.0675	.0675
June.......	.....	.046	0.012	.054	.0740	.0975	.0525	.0575
July.......	.....	.036	.006	.047	.0310	.0800	.0325	
August.....	0.014	.008	.008	.023	.0375	.0650	.0225	
September..	.015	.....	.034	.030	.0450	.0525	.0500	
October....	.018	.007	.050	.050	.0800	.0850	.0500	
November....	.008	.....	.027	.029	.0575	.0475	.0475	
December..	.006	.....	.....	.047	.0400	.0375	.0500	

Two weeks before Christmas, 1929, a general distribution was made of the bonuses which had accumulated during the year. The total amount distributed in this manner was approximately $9,000. Through the monthly payrolls an amount even greater had been distributed, the total bonus payments for the year aggregating $21,531. The amount of the individual bonuses varied, the highest three awarded being respectively $184, $177 and $174.

Every day the receipts per car-mile of the previous day are posted in the trainmen's quarters at the carhouse. The cumulative earnings of the month are also published, so that the men can determine very closely, from day to day, just what the month's bonus is going to be. The entire force takes a lively interest in this and follows the company's fortunes closely.

Edward A. Roberts, general manager of the property, is convinced that the men are making a real effort to increase the company's business, and that their efforts along this line are largely responsible for the success that has been attained. He is also convinced that the accident clause in the agreement with the men has had a salutary effect. In order to clear themselves of responsibility, the trainmen are provided with "my own fault" cards, upon which they secure, if possible, the signatures of drivers or others with whom they become involved in accidents. This practice has proved effective in reducing damage settlements, the expense of which, during the past year, totaled less than 1 per cent of the gross receipts. Since the bonus plan was inaugurated there have been no labor troubles of any description, and the management believes that the plan has had the effect of stabilizing employment, particularly among the older trainmen and shop employees.

Employee PENSION PLANS

Survey covering 27 electric railways shows unanimous agreement concerning desirability of pensions. In almost all instances entire cost is carried by company, and difficulties are anticipated as number of eligibles increases.

PENSIONS for veteran employees and methods of financing such an arrangement have been receiving more and more attention from electric railway executives during recent years. On some properties pension plans have been in effect for more than twenty years, and on a considerable number they have been in effect for ten or fifteen years. Recently has come the discovery that the payment of benefits is exceeding the early estimates, and the annual appropriations for pension purposes are assuming considerable proportions. It appears likely that this problem will become more serious as time goes on. For the purpose of determining the facts of the situation, and to secure the opinions of executives of companies where pension plans are in effect, ELECTRIC RAILWAY JOURNAL has made a survey covering more than a score of such properties in the United States and Canada.

Considerable similarity in the experience of the various companies was disclosed by the survey. Without exception the executives expressed the opinion that a pension plan of some kind is desirable. At present very few of the railways have established any reserve to meet pension requirements. The almost universal practice is to make payments from current earnings. As the number of employees eligible for pensions has increased, this policy has created a serious problem. A majority of the executives believe that the present plan is not satisfactory, but opinions vary concerning steps which should be taken to improve the situation.

Discussing the desirability of pensions, J. N. Shannahan, president Omaha & Council Bluffs Street Railway, states: "In general, I consider a pension plan for old employees a necessary arrangement, and if there were none in effect I am sure we would have to take steps toward the adoption of one." A similar opinion is expressed by K. B. Thornton, general manager Montreal Tramways, who says: "I believe that it is only fair and right that the company should grant a pension to employees after a period of 25 years of faithful service, and I think that the company should devise some means whereby it can be provided."

A pension plan is very desirable both for the company and for the employees, according to T. Julian McGill, vice-president Twin City Rapid Transit Company. On this subject he says: "It is quite impossible to discharge men who have become too old or too disabled to perform a satisfactory day's work after they have worked for a company for many years. Without pensions, such situations require donations or special jobs, making somewhat of a beggar of the employee and naturally decreasing the efficiency of the company. We consider an old-age pension essential both from a business and a humane standpoint."

Speaking for the Washington Railway & Electric Company, H. C. Kimball, assistant to the comptroller, says: "We consider a pension plan to be a practical and satisfactory arrangement and we would favor the establishment of the same if we did not already have one in effect." Similar sentiments are voiced by F. L. Butler, vice-president Georgia Power Company; Fred D. Gordon, vice-president and general manager Cumberland County Power & Light Company; C. C. Vargas, vice-president Key System Transit Company; Elton S. Wilde, president Union Street Railway, New Bedford, Mass., M. H. Parkinson, auditor Municipal Service Company, Altoona, Pa., and Hugh J. Sheeran, president New York Railways Corporation.

AGE AND SERVICE REQUIREMENTS

In general the pension plans in effect in the electric railway industry stipulate an age limit for retirement of from 60 to 70 years, with a requirement of from 20 to 25 years of continuous service. Continuous employment, however, appears to be variously interpreted. On some properties a lapse of employment of six months to a year is provided; with other companies a longer period is allowed, provided the man's service record is satisfactory. The majority of plans provide for disability retirement at an earlier age, or with a lesser period of service. Certain properties also give wide discretionary powers to a "pension committee," so that execptions may be made in meritorious cases. The Boston Elevated even provides for the extension of pension benefits to the widow for a period of one month or longer at the discretion of the committee. In a number of instances eligibility depends upon membership in the employees' benefit association.

Employees of the Interborough Rapid Transit Company, New York, who shall have attained the age of 70 years, provided they have been in the service not less than 25 years, are eligible to a pension. The plan also provides for pensions to employees with 25 years of service, regardless of age, who have become permanently disabled. The plan of the Omaha & Council Bluffs Street Railway, Omaha, Neb., provides arbitrarily for the retirement on pension of any employee 70 years of age who has been continuously employed for 20 years or more, but an employee with 20 years of service and 65 years of age may, at his option be retired. A disability clause also provides for the retirement of any employee with a service record of 20 years, provided disability is incurred while in the discharge of his duties.

The Washington Railway & Electric Company, Washington, D. C., divides its eligibles into five classes: (a) Employees 70 years of age, with 15 years of service; (b) employees over 55, with 15 years of service, who have become physically disqualified; (c) employees with

ANALYZED

15 years of service who have become physically disqualified by reason of injuries received in the discharge of their duties; (d) employees under 55, with 15 years of service, who have become disqualified may be granted limited pensions, within the discretion of the pension board; (e) employees with less than 15 years of continuous service who have become disqualified by reason of injuries received while in the discharge of their duties, for which they are neither wholly nor partially to blame, may be granted pensions for a limited period.

The Boston Elevated Railway is another property which classifies its pension eligibles into various grades, namely, all employees of an age of 65 years or more, with 20 years of service; employees aged from 60 to 64 with 25 years of service, and employees less than 60 years of age with 30 years or more of service. At the discretion of the pension committee and with the approval of the board of trustees, any employee with a 15-year service record who has become totally disabled as the result of accidental injury arising out of and in the course of employment by the company, may be granted a pension. It is further provided that employees with 20 years of service, regardless of age, may be retired if disabled as the result of sickness or injury.

Any employee of the Twin City Rapid Transit Company who has reached the age of 70 years, with 20 years of continuous service and who is a member of the employees' mutual benefit association, and whose salary has been $250 per month or less, is pensioned. Continuation in the service of employees past the age of 70 is subject to the approval of the medical director, department head and the president of the company. An employee who has reached the age of 60 years, whose salary and service render him eligible to a pension, may be pensioned at the option of the pension board. If incapacitated after 15 years of service, an employee is also eligible.

Key System Transit Company, Oakland, Cal., draws a line between employees who "may" and who "shall" be retired. All officers and employees who have attained the age of 70 years shall be retired; such of them as have a continuous service record of 20 years or more are entitled to pensions. Certain classes, including conductors and motormen, may be retired at 65 with pensions, if they have been 20 years or more in the service. Employees between 60 and 70, who have been 20 years or more in the service and who have become incapacitated and who cannot be transferred to other work which they are able to perform, may be retired and pensioned. The same rule applies to employees under 60, with service records of 25 or more years.

Effective Jan. 10, 1930, the Montreal Tramways Mutual Benefit Association, by a large majority of its membership, approved a resolution reducing the retirement age from 65 years to 60 years, at the same time raising the daily pension from $1.50 to $2. One of the most liberal of the plans is that of the Bangor Hydro-Electric Company, which provides for voluntary retirement with pension at age 65, and compulsory retirement with pension at age 70, in each case only 12 years of continuous service being required.

Ready to retire after a quarter century of faithful service. What provision has his company made for his future?

Eligibles under the retirement pension plan of the Georgia Power Company, are classified under four groups. Those who have been in the service more than 30 years and who are 60 or more years of age, are automatically retired with pension, unless they express a desire to continue in the service and are deemed capable of performing their duties. The other groups grade down to 15 years of service, regardless of age, where the employee has become permanently disabled in the course of his employment.

The plan of the Cumberland County Power & Light Company, Portland, Me., makes provision for the enforced retirement of men employees at the age of 65 and of women employees at the age of 60, unless for special reasons they desire to be continued in active service. This plan also provides that men may be retired at age 60 and women at age 55.

One large Southern property has no age retirement and does not pension employees on the basis of age alone, its present arrangement including only employees with 15-year service records who have become disabled. This same property, however, is now considering a general pension plan for taking care of aged employees.

Pensions are available to employees of a railway in the Mid-West after they have been continuously in the service of the company for 15 years. Retirement is optional at 60 years of age and compulsory at 70. Employees who have become totally and permanently incapacitated for further duty with the company, provided they have been in the service for 15 or more years continuously are entitled to a pension for a maximum period of 14½ years.

Many companies make provision for the eligibles to be continued in the service where they are physically able to perform their duties and choose to do so, rather than to retire. In some cases it is arranged to assign superannuated employees eligible to pensions to lighter tasks. Obviously, any arrangement which defers the day of retirement works to the advantage of the pension fund. Not only is the payment reduced but also the life expectancy over which pensions would have to be paid is shortened. The Montreal Tramways latest report shows 66 employees still on the payroll, each of whom had a service record of 35 years or longer. A considerable number of these have passed the retirement age of 60 years, but evidently prefer work at substantial wages to retirement on $2 per day.

It is provided in practically all of the plans now in effect that the pensioned employee may, at his option, engage in other work so long as it is not of a character detrimental to the company's interests.

Pension Rates Based on Previous Wages for Various Periods

General practice appears to favor basing the amount of the pension upon the average annual wages earned during the ten-year period prior to retirement, multiplied by the number of years of service. The amount is usually further fixed by maximum and minimum stipulations. An exception to this rule is the Montreal Tramways plan which provides a flat pension of $2 per day.

The pension plan of the Twin City Rapid Transit Company provides that any employee whose continuous service began prior to July 1, 1924, is entitled to a pension amounting to 2 per cent of his average monthly salary during the last ten years of service, multiplied by the number of years of continuous service, but in no event more than $50 per month, provided his salary or wage has been $175 per month or less. An employee receiving an average wage of from $175 to $250 per month may receive a pension not to exceed $60 per month. Employees beginning their continuous service subsequent to July 1, 1924, may receive 1.5 per cent of their average monthly wage the last ten years, but such monthly pension may not exceed the following: $40, if the average ten-year salary is $150 per month or less; $50, if the average ten-year salary is $151 to $175 per month; $60, if the average ten-year salary is $176 to $250 per month.

The Omaha & Council Bluffs Street Railway has a plan which provides for conductors and motormen a pension of $1 per month for each year of continuous service, with no pension exceeding $30 per month. Other employees eligible to pension are retired on an allowance based upon 1.25 per cent of the annual wages received at the time of retirement, multiplied by the number of years of continuous service; but no pension shall equal more than 35 per cent of such employee's salary or wages received at the time of retirement, and in no event shall it exceed $500 per annum; neither shall any pension be less than $20 per month. The plan of the Interborough Rapid Transit Company, New York, provides for pension allowances upon the following basis: For each year of service 1 per cent of the average monthly wages based on the rate of pay for the ten years next preceding retirement, provided that in no case shall the aggregate pension allowance be less than $20 per month.

Pensions of the Bangor Hydro-Electric Company are computed upon the basis of 1.5 per cent of the average monthly pay received during the last ten years before retirement, multiplied by the number of years of service. The minimum pension is $15 per month.

The Boston Elevated Railway has had a pension plan in effect since 1920. In the intervening years several changes have been made in the provisions of the plan, but the present arrangement provides that the amount of the pension shall equal 1 per cent of the average yearly earnings for the ten years prior to retirement, times the number of years continuously employed, but such pensions shall not be more than $2,000 per year nor less than $375 per year.

Pension allowances authorized by the Washington Railway & Electric Company are fixed upon the following basis: If the service has been continuous for 15 and less than 20 years, 20 per cent per annum, in equal monthly installments, of the average annual wages for the ten years next previous to retirement; if the service has been continuous for 20 and less than 25 years, 25 per cent of the average annual wages for the ten years next previous to retirement; if the service in the company's employ shall have been continuous for 25 years, 30 per cent per annum of the average annual wages for the ten years next previous to retirement; if the continuous service exceeds 25 years, then for each year in excess thereof there shall be allowed an additional 2 per cent of the average annual wages for the ten years next previous to retirement. It is provided, however, that the pension allowance to any employee shall be not less than $20 per month nor more than $50 per month. There is further provided a funeral allowance of $100 to be paid upon the death of any employee on the pension roll.

Wide discretionary powers are vested in the pension board of the Key System Transit Company, Oakland, Cal., by a clause which provides that "for exceptionally long and unbroken service, with first-class record, or for other good and sufficient reasons apparent to the board of directors, upon recommendation of the board of pensions, the board of directors may, at its discretion, place any officer or employee on the pension list and fix a pension or pensions at such an amount as may in the judgment of the board of directors be equitable and appropriate." The regular pension allowances of this company, however, are authorized upon the following basis: For each year of service, an allowance of 1.5 per cent of the first $50 of the highest average monthly pay of the officer or employee during any consecutive ten years of service, and in addition, 1 per cent of any excess of such highest average monthly pay over $50; provided, however, that in no case shall the allowance made be less than $20 nor more than $75 per month.

The plan of the Georgia Power Company contains a clause providing that "all annuities shall be based on the gross earnings of employees during the 12 months next preceding their retirement."

The amount of each pension is based upon a combination of age and years of service, under four classifications. Those 60 years old, with 30 years or more of service receive a yearly sum equivalent to 30 per cent of the gross earnings, as set forth above. Those with service records of 25 years and not more than 30 years, receive 27.5 per cent, while those with service records of between 20 and 25 years, and who have reached the age of 60, receive 25 per cent of the last twelve months earnings. Total disability, following 15 years of service, regardless of age, entitles the employee to a pension based upon 25 per cent of his last year's wages.

Retirement annuities of the Cumberland County Power & Light Company range from 1.5 per cent to 2 per cent of the average annual salary of the employee for the period of continuous service, times the number of years of service, but not exceeding 50 per cent of the final annual salary nor shall the amount exceed $6,000 per year.

Payments Made From Current Earnings

Few of the properties reporting have set up an adequate reserve to meet future or accrued liabilities. The usual method followed is to make payments from current earnings. A notable exception is the Montreal Tramways, whose plan, based upon well-considered principles, has permitted the accumulation of a reserve of more than $540,000. Following an analysis of its plan in 1923 the Twin City Rapid Transit Company began to deposit to the credit of its pension fund $10,000 per month. At the present time payments are aggregating about $50,000 per year, and the company's reserve as of July 1, 1930, has reached $608,159.32. Another large company inaugurated its pension plan in 1910 by setting aside 0.25 per cent of its gross receipts to meet contingencies. A reserve of approximately $50,000 has been accumulated during the intervening years, but at the present time pension disbursements are taking practically all of the regular allotment and no additions are being made to the reserve. One of the most recent plans, that of the Cumberland County Power & Light Company, makes provision for setting aside 1 per cent of the annual payroll from which to meet future retirement pensions.

"Under the terms of our agreement with our employees' mutual benefit association," writes a Mid-West executive, "the company sets aside 1 per cent of its operating revenues to cover relief work and pensions. The balance available after current payments on these accounts is turned over to a trustee to be credited to the pension fund, but in no event is the amount so created to be less than 0.5 per cent of the company's operating revenues in any one year. The employees themselves make no contribution to the pension fund."

With a few notable exceptions none of the plans examined provide for contributions from employees, although several properties maintain benefit associations or even life insurance plans in which employees participate through regular deductions from their wages. Members of the Montreal Tramways association are charged an admission fee of $1, and pay monthly dues of $3. This sum, however, covers much more than the pension, as the association pays its members sick and disability benefits, as well as permanent disability benefits, provides medical and pharmaceutical attention and pays the premium to an outside company on group insurance to the amount of $1,000 on each member.

The Washington Railway Relief Association, maintained and supported by employees of the Washington Railway & Electric Company, provides, among other things, for sick benefits, life insurance and a pension of $30 per month to each member who receives a pension from the company. There is, however, no connection between this pension and that of the company, so the plan cannot be strictly classified as a contributory one.

While few of the properties providing pensions appear to have sought actuarial advice when the plans were inaugurated, a number have since done so and others are contemplating early action in this direction. When the Montreal plan was first organized a competent actuary analyzed it and decided that the association could be successfully conducted along the lines proposed.

One large operating company states: "We have had actuarial computations which show that in the course of years the monthly payment will be extremely high." Another company writes, "When these two plans (pension and group insurance) were put into operation it was forecast that the maximum liability would be reached in five to six years, but this was not the case. In 1929 a detailed study was made of the future liability, and it was estimated that the costs would be 40 per cent greater in ten years than at the present time." One property which has gone into the matter very thoroughly was told by actuaries that $2,250,000 should be invested to guarantee payment of future pensions. Another estimates its pension liability at $500,000.

The Montreal Tramways, which has always supported its employees' mutual association most generously, appropriated for this purpose $158,721.26 in 1929, an increase of $16,260.85 over the 1928 allowance. Union Street Railway reports that 0.68 per cent of the total payroll was required to meet pension payments between 1925 and 1929. It is estimated that 1930 payments will require 1.13 per cent of the company's gross revenues. Another property is at the present time paying out in pensions between $5,000 and $6,000 per month. The Interborough Rapid Transit Company provides for its pensions out of a company donation of "not to exceed $50,000 per year." The Twin City Rapid Transit Company sets aside $10,000 each month for this purpose. The present annual cost of the Omaha & Council Bluffs Street Railway pension plan is estimated at $24,000.

Obligations Become Larger than Original Estimates

From the tenor of the replies received in the Journal survey it is quite apparent that a number of the companies which have adopted pension plans are experiencing difficulty in meeting their growing obligations, while others anticipate difficulty in the future. One company has already announced that, while present pensioners will be taken care of so long as it is possible to do so, no further pensions will be granted until the company's financial position is improved. Another property, in the hands of a receiver, anticipates difficulties at an early date.

The Washington Railway & Electric Company writes: "The number of pensioned employees and the amount of their payroll is at present in excess of the original figures planned by our management, and as time goes on it will undoubtedly be necessary to make some changes in our present system in order to provide for the gradually increasing number of pensioners." A company which, in addition to supporting a pension plan, also carries group insurance for its employees writes: "Our payments for 1929 were much in excess of the maximum estimate when these forms of gratuity were adopted." This company rewrote its entire plan quite recently. Existing pensions will be carried on as heretofore, but the pensions of employees who retire in the future will be considerably reduced below the former figure. Even so, the mounting costs of this form of relief are causing the management serious concern. The Boston Elevated Railway has been obliged to reduce its pension allowance 1 per cent, effective Sept. 1, 1929.

"On account of the average age of our employees I expect that the pension obligations will become very heavy as time goes on," writes C. C. Vargas, Key System Transit Company, while another manager states that although no present difficulty is anticipated he is concerned as to the future and proposes to have an actuarial analysis made. The Georgia Power Company views the future with some uncertainty, in the belief that the present setup holds the possibility of difficulties later on.

"Ours is a joint utility, doing both an electric railway and an electric power business," writes one executive, whose company is setting aside 1 per cent of its operating revenues to meet pension and relief payments. "In the electric utility, which is the fastest growing service, the quantity of labor required per dollar of operating revenue is materially less than in the railway department. The faster growth of the electric business is, therefore, continuously operating in our favor. With the railway utility alone we are quite sure that our present reserve provisions would prove inadequate. The net result has probably been to gradually strengthen the position of the reserve, and while we are not certain of the present adequacy of our reserve fund, we feel that its position is steadily being improved. Certainly, we are in no serious or immediate danger."

With few exceptions the present plans are not definitely contractual. Protective clauses usually provide that the amount and terms of the pensions may be changed or discontinued at the discretion of the management. A typical protective clause provides as follows: "Whenever it shall be found that the basis of pension payments herein provided shall, in the judgment of the president of the company, create demands in excess of the company's revenues available for pension payments, a new basis ratably reducing existing and future pension payments shall be established." Another plan stipulates that "the foregoing provisions for pensioning aged and injured employees are and are to be accepted as purely voluntary and gratuitous, and as imposing no contractual or other obligations upon the part of said companies to continue the same, either as a whole or in any individual case or cases, or to deny to said company the right to withdraw from the same, or to discontinue the said pension, or any individual pension thereunder, if at any time, in their own judgment and discretion, it shall be expedient or desirable to do so, in which event all or any pensions allowed thereunder shall forthwith cease."

The pension plan of the Interborough Rapid Transit Company contains the following clause: "Whenever it shall be found that the pension allowances shall create demands in excess of the annual appropriation ($50,000), and as often as such conditions shall arise, a new basis ratably reducing the pension allowance shall be established to bring the expenditures within the limit of the fund, and the decision of the board of directors in establishing such a basis shall be absolutely conclusive." The Boston Elevated Railway reserves the right to reduce all pensions pro rata so that the entire expenditures for pensions during any year shall not exceed 2 per cent of the salaries and payroll for that year. The Omaha & Council Bluffs Railway plan contains a section which states: "The establishment of this pension system by the company is purely voluntary and gratuitous . . . and the company hereby reserves the right to alter or abolish the pension system and all allowances under it. . . ."

The plan of the Georgia Power Company expressly states that "the company reserves the right to discontinue any and all annuities or any part thereof at any time." The company further reserves the right to withdraw or discontinue all annuities theretofore granted and then being paid, and to alter or amend the plan as necessity may dictate.

Anticipating possible future pension legislation the Cumberland County Power & Light Company stipulates that "in case any benefit, annuity or pension shall be payable by the company under the laws now in force, or hereafter enacted, in any state or county, . . . the excess only, if any, of the amount prescribed in this plan above the amount of such benefit, annuity or pension prescribed by law, shall be the benefit or annuity payable under this plan." The company's board of directors is further authorized under the plan to "annul, alter, add to, or amend, any and all provisions contained in this resolution."

"The establishment of this pension system," reads a clause in the plan of the Bangor Hydro-Electric Company, "is intended only to declare the present policy of this company and to give authority and instructions to the officers of the company to carry out this policy, and neither the establishment of the system nor the granting of the pension, nor any action now or hereafter taken by the pension board or officers of this company shall be held or construed to create a contract." It is further provided that "the company hereby expressly reserves the right . . . to terminate the pension system or any pension or pensions previously allowed, or to modify the pension system in any respect either generally or in its application to any specific case."

Contributory Support Desirable

Few of the pension plans now in effect require any contributory support from the employees themselves, although a number of executives replying to the Journal's inquiry expressed themselves in favor of some such arrangement. For example, one executive writes: "From our experience, I do not believe a company itself should attempt to carry a pension plan; it should be taken out with one of the established life insurance companies. A pension plan, in effect, is for the purpose of creating an estate for an employee in his old age from which he may derive an income. If his savings plus a similar contribution on the part of the company could be held over a term of years until he comes to the retirement age and then distributed to him with interest over the remainder of his life, it would have the same effect as a pension plan and might have some better features. I feel that our men would appreciate a pension plan more if they were to contribute to a portion of it."

"I believe that the employees should contribute to this future annuity," writes a general manager whose company has a successful plan in operation, "and that the employer should charge against each year's operations the present value of his future pension liability accruing on account of employment during any year. I further believe that the employers' and the employees' contributions should be deposited with some outside trustee."

"I am strongly convinced that the employee should pay something toward his pension," writes an executive whose company has supported a pension plan for the past sixteen years. "In the first place," he continues, "one is not so apt to appreciate something for nothing as he would something to which he had personally contributed. In the second place, it is an increasingly heavy drain on any company to carry its pension costs unaided, especially where there is a very small labor turnover. More and more men are growing old in the service and will ultimately be candidates for pensions."

Group participating in track foremen's training classes conducted by the Cleveland Railway

SELLING AN IDEA
to the Foreman

> *"IF YOU were asked who is the key man constituting the bridge between capital and labor, between executives and wage earners, what would be your reply? Mine would be the foreman. The influence, the importance of the foreman is but poorly understood by many employers. Correcting this defect would mean much for the furtherance of better relations between employers and employed and of national stability. American foremen, collectively, have more to do with molding sentiments among the rank and file of the people and families of this country than politicians, editorial writers, preachers, teachers, or labor union leaders, or any other class. Training schools for foremen should constitute an outstanding feature of American industrial and economic life."*
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> —B. C. FORBES, EDITOR *Forbes' Magazine* *quoted from the Cleveland News*

By HOWARD H. GEORGE
Superintendent of Way Cleveland Railway
Cleveland, Ohio

In the belief that standardization of track construction and maintenance methods can best be brought about by uniformity of instruction, the Cleveland Railway has conducted a foremen's training course which has produced excellent results.

ON THIS very important subject the writer is in full accord with Mr. Forbes. Many track operations today require more than ordinary skill and training for which the run of common labor is not fitted. Because of the conditions which exist in the field from which our labor must be recruited, it is doubly important that the work be in the charge of a competent foreman and that each foreman be thoroughly instructed as to what is expected of him.

In order to put this theory into practice, there was organized, during the past winter, in the Way Department of the Cleveland Railway, a track foremen's training class. The membership in this class comprised all division foremen and general foremen, together with a selected group of foremen and sub-foremen, whom we had reason to believe would develop, in such a school, into suitable foreman material. Classes were held one evening each week during the first three months of the year, and attendance was compulsory for the division foremen and general foremen, but optional with the others.

A regular series of talks was mapped out in advance covering all the more important phases of track construction and maintenance operations. These talks were mimeographed and, at the close of each class, a copy

Code of Ethics for Foremen

CLEVELAND RAILWAY—WAY DEPARTMENT

[1]

The foreman should regard his profession as a field of social service offering an opportunity to help working people obtain maximum satisfaction from life.

[2]

The foreman should endeavor to earn, and guard carefully, a reputation for good moral character, good citizenship and common honesty, and to support and promote the uplifting influences of the community.

[3]

The foreman should recognize that every man above, beside, or below has an inherent desire to do good work and to be a useful and respected citizen. He should not assume that any man wants to do anything less than his best until he has considered every other possible motive.

[4]

The foreman should keep an open mind on all subjects, striving to maintain a broad and balanced outlook, and being always willing to recognize merit in another's ideas.

[5]

The foreman should deal fairly with the management, the men and other foremen, assuming responsibility for his own mistakes and refraining from shifting blame to others.

[6]

The foreman should strive to understand the principles of business which make for success or failure of industry. He should pass at least some of the fundamentals of business principles along to his men, so they can see their own relation to the general scheme.

[7]

The foreman should keep informed as to the latest developments in equipment and processes. He should recommend, or put into effect, such methods as will produce improved quality, lower costs for the product, and better working conditions.

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was given to each member present. Each lecture was informal but covered the same field as the printed copy which the men afterwards received, so that they had it available for reading and study during the ensuing week. The talks were illustrated with blackboard sketches, models and large scale blue prints.

The first half hour of each evening was devoted to a written examination covering the subject of the preceding week. The next three-quarters of an hour were devoted to the subject for the evening. There followed fifteen minutes for reading to the class the correct answers to the questions covered by the quiz of the evening, and the last fifteen minutes were devoted to general questions and answers.

Perhaps some of you will say "Maybe George can do it, but if all his track foremen can read and write, he is more fortunately situated than I am." My answer is that our situation in this respect is actually no different from that which probably exists on any other property of our size. Out of the total registration of 45 in the class which we conducted, ten were of general supervisory grade and were not required to take the written examination. The men, however, were required to attend class and assist in the conduct of the examinations, as will be explained more fully later. Of the remaining 35 who took the examinations, nineteen were unable to read or write although, in every case, they had been track foremen or sub-foremen for many years. Most of the men who could not read or write were Italians. Where the men were unable to read for themselves, they arranged to have some one read the various lectures to them during the week. Usually this was done by one of the older children in their own family who had the advantage of at least a grammar school and frequently a high school education.

In the written quizzes, we assigned one of our supervisory force or some one from our engineering department to sit with each man who was unable to write. These helpers read and explained the questions and put down the student's answers in as nearly their own language as possible. Each question was given a rating, based upon a total mark of 100. In no case did spelling, grammar, punctuation or penmanship play any part in the grading of the answers. We were entirely satisfied if the answer convinced us that the man knew what the correct answer was in each case.

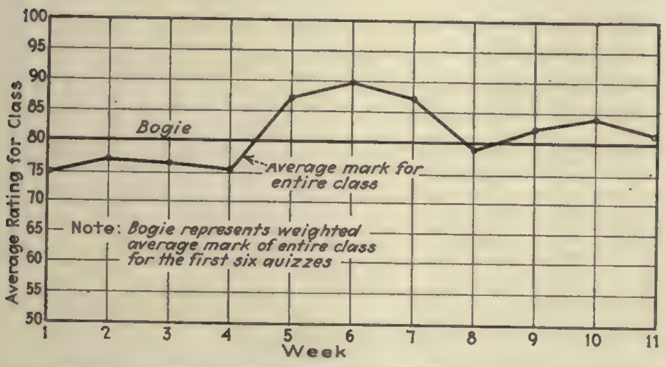
Model of grooved girder rail and tie assembly, with screw spikes and clips, used in demonstration before foremen's training group

At the opening of the course, each member was furnished a copy of the small printed booklet prepared by Howard J. Montgomery, Chicago, entitled "If I Were a Foreman." This booklet, while necessarily containing some reflections which do not apply to the track foreman, certainly does contain many observations which fit his case admirably, and if the track foreman will study them and apply as many as possible to his own case, he cannot help but increase his value to his employer and raise himself in the estimation of those directly under his control as well. In addition, we furnished each man in the class with a copy of the Code of Ethics for Foremen, which was prepared by a committee of the National Association of Foremen.

The subjects scheduled for discussion at the various classes were as follows:

Purpose of Course and General Duties of Track Foreman.
Subgrade, Drainage and Ballast.
Ties.
Rails and Rail Joints.
Miscellaneous Rail Fastenings.
Track-laying and Surfacing.
Pavement and Its Foundation.
Welding and Grinding Rails and Joints.
Track Tools and Equipment.
Track and Pavement Maintenance Practices.
Safety First Talk on Accident Prevention.
Review and Track Construction Moving Pictures.

When the classes were announced, we were flooded with requests to be allowed to attend, and could easily have formed three classes had membership been thrown open to all applicants. In order to ascertain how much of the interest was real and how much was forced, we extended to any one in the class the privilege of dropping out after the fourth session, but only one man took advantage of the opportunity. The men were willing and anxious to learn and displayed a disposition to work hard and acquire what knowledge we were trying to teach them.



Progress made by Cleveland track foremen's class, as indicated by average rating of all quiz papers submitted. The heavy horizontal line represents the bogie, determined by calculating the weighted average rating of the class for the first six quizzes

There was, at first, a feeling among a number of the men that they were being examined for the purpose of determining whether or not they were to be retained in the service or discharged, and there was, as a consequence, some uneasiness on this score. We were soon able, however, to reassure every man on this score by making it clear that we had but two objects in view in organizing the class. The first was to help the men increase their own knowledge of the business, and to enable us to become more familiar with their individual qualifications. The second was that, through the course, the Cleveland Railway would benefit by reason of better supervision of its track work, with a resulting higher standard of construction and consequent longer life of its track structure.

What we are trying to do is to give every foreman the same kind of instruction, to the end that our work may be more uniformly done. We are striving to impress upon the mind of each man the important relation between the care which is given the various details of construction and the life of the structure. The only practical way this can be accomplished is by getting the men together in a class.

Just how much we will be able to accomplish, as compared with the goal towards which we are striving, remains to be seen. Judging, however, from the interest which every man in our last winter's classes displayed, and from the intelligent questions which were asked in open class, there is no doubt regarding the outcome, and we will undoubtedly make this class an annual affair. It is even possible that the course will be split into two classes, one for the more advanced men, the other for the more backward. Suffice it to say that the results obtained thus far have fully justified our expectations.

Effective Sales Promotion Work by Trainmen at Norfolk

By F. C. Womack

Manager of Transportation Norfolk Division
Virginia Electric & Power Company

SALES promotion of street car and bus transportation is the only solution for the gradual yearly falling off in gross revenue that is now so threatening a menace to the very life of the industry. Definitely committed to this policy, the Norfolk division of the Virginia Electric & Power Company is preparing to launch an intensive campaign of transportation sales promotion in Norfolk which is in line with like campaigns to be inaugurated in the other divisions of the Virginia Electric & Power Company in Richmond, Portsmouth and Petersburg.

With the steadily increasing popularity of the automobile, there has been a corresponding decrease year by year in the gross revenue to transportation companies throughout the country for street car and bus transportation. This decline, which during the past five years has varied between one and five per cent annually, presents a grave emergency which transportation companies must meet and overcome if they are to continue to furnish reasonably good service.

During this same period, realizing that the emergency must be met, transportation companies have concentrated their efforts toward reducing the cost of operation and at the same time increasing efficiency. In this they have, as a rule, been remarkably successful. Under the principle of mass purchasing and other modern methods, the companies have been able during this period to greatly increase efficiency, replace old with modern equipment, speed up schedules and, at the same time, pay a higher wage to the operator—all at a decreased yearly cost of operation.

This decrease in the cost of operation, to some extent, has acted as a sort of financial buffer to take up the shock of the gradual falling off in gross revenue. The situation has now reached the place, however, where the cost of operation has been cut to the bone, and still there is no letting up in that gradual falling off in gross revenue. The one solution which will solve the problem is the "selling" of bus and street car transportation to the public.

The main cog in the operation of this sales promotion machinery is the operator of the street car or bus. Through our experience in accident prevention contests, we have found that the men who operate our street cars and buses are always ready and willing to stand foursquare behind whatever move for the betterment of the company in which the officials show a real interest. Convinced that the officials were vitally interested in the reduction of accidents, the Norfolk division during March reduced the number of accidents to less than 50 per cent of the number for the same month a year ago. Last year the total number of accidents in the Norfolk division was 273. This year it has been reduced to 127. One of the main factors in this reduction was the fact that the men at the controls of the street cars and buses, realizing that the heads of the company were vitally interested in reducing accidents, became imbued with the same interest.

A similar result can be achieved when the operators realize that the heads of the company are vitally interested in increasing the number of customers. Once we can get the operators to look upon every pedestrian and every person they see in a private automobile as a potential customer to be treated as such, much will have been accomplished toward selling street car and bus transportation to the public.

But this is only the first step in sales promotion. Following close behind this there must be a concentrated effort toward educating the public away from the single cash fare. In every instance possible an effort will be made to sell the customer tokens or a weekly pass. One of the characteristics of the American people is that they are inclined to use what they have. Sell a man six cigars and he will smoke twice as much as he would if he bought these cigars one at a time. Sell him a block of theater tickets good any time during a period of six months and he will use them up in the first six weeks. The same is true of street car and bus transportation. Half a dozen tokens sold at one time mean that the customer will ride just about twice as often as he would upon a cash fare basis.

As a final link in the sales promotion activities of the Virginia Electric & Power Company, a group of highly intelligent salesmen will be employed to carry the message of street car and bus transportation direct to the potential customer. To those people living along the suburban lines who have been accustomed to depend upon their own automobiles in most instances and who use the street cars and buses infrequently, the railway will appeal upon the basis of economy, showing them in actual dollars and cents that we can carry them to and from their places of business at a saving. At the same time we are committed to a program of speeding up these suburban lines and maintaining thereon regular schedules of operation that can be depended on. We expect the going to be hard in these sections at first but in the end, we feel certain we will be able to greatly increase business along these suburban lines.

It is an entirely different story with the car owner living in those districts where frequent and steady schedules are maintained and it is upon this type of potential customer that the transportation salesmen will concentrate their activities. In every city there are literally thousands of car owners—merchants, professional men, clerks, salesmen, men in practically every walk of life—whose daily activities are confined to a single office building or store in the business district. For month after month and year after year these men have been using their private automobiles as a means of transportation to and from work all unmindful of the fact that the power company maintains bus and street car service in their district that offers transportation that is not only cheaper but faster than their own cars. It is this type of citizen who must be sold upon bus and street car transportation if the steady decline in gross revenue from this source is to be checked.

Selling of this transportation is to be no hit or miss proposition. There will be no dealing in generalities when our salesmen approach these prospects. Each man's individual case will be surveyed and studied for weeks in advance before the salesman calls upon him. As a result, the transportation salesman will have concrete facts to work upon when he goes in to sing the praises of street car or bus transportation.

These data are to be obtained first through a study of the automobile license numbers in the different parking stations in the business district and along those streets where parking throughout the day is permitted. Through a follow up system the names of these different car owners will be secured and then for several days the movement of each car will be studied. Distance between the parking station and the place where the owner is employed will be computed, driving hazards will be determined, the cost of parking will be determined and a check of the actual weekly mileage in driving between home and work will be computed.

Once these data have been compiled—and they will be comparatively easily secured—the transportation salesman will call upon the prospect armed with information which will prove conclusively that the bus and the street car offer him quicker, safer and cheaper transportation day after day, week after week, and year after year between home and work. We believe that this campaign will prove effective. We believe, also, that it is the only manner by which this steady decline in gross revenue from bus and street car transportation can be stopped.

London "Tube" Extensions to Cost $65,000,000

CONTRACTS amounting to approximately $65,000,000 are about to be placed by the London Underground group of railways for extensions and reconstructions on the Piccadilly line. Two extensions are to be started, one to the north from Finsbury Park to Cockfosters, at a cost of $25,000,000, the other west from Hammersmith to Northfields, at a cost of $17,500,000. The balance of the $65,000,000 is to be spent on reconstructing existing stations.

The whole of this work will be carried on simultaneously, and will give employment, when in full swing, to more than 20,000 men. It is hoped to complete both extensions and reconstructions in from 2½ to three years.

This concentrated effort, the largest ever embarked upon by the Underground group in so short a space as three years, has been rendered necessary by the phenomenal growth of London traffic in post-war years.

Work on the Cockfosters extension is expected to commence on Sept. 1 and to occupy two years to complete, but as soon as the line has been carried as far as Arnos Grove, roughly one-half the total distance of 7½ miles of track, it will be opened to the public.

The construction work will involve tunnelling from Finsbury Park nearly to Arnos Grove. There the line will come out into the open, and will be carried across Arnos Park by a viaduct, to disappear into a tunnel on the north side, where the land rises considerably, coming into the open again at Chase side. Thus in the 7½ miles there will be 4 miles of tunnel.

The western extension to Northfields will follow the line of the District Railway. It will be above ground all the way.

Leicester Square is to be made into a subsurface station. It will be a second Piccadilly Circus, but on a smaller scale, with one set of escalators connecting direct with the platforms. Four entrances will be provided to the booking halls from the pavement level, one at the Hippodrome Corner, another at Wyndham's Theater Corner, and two just north of the present station on either side of Charing Cross Road.

In the reconstruction of Dover Street station the existing entrance will be abolished. Two new entrances provided, one on the south side of Piccadilly, close to the Ritz Hotel and the entrance to Green Park, and the other on the north side near Devonshire House. These will lead by escalators to the platforms.

Similarly, at Hyde Park Corner, entrances are to be made to the station from both sides of the thoroughfare, so that it will be possible to walk by a subway under the road between St. George's Hospital and the Park.

At Knightsbridge the alterations contemplate the construction of new entrances at the top of Sloane Street to the east and at the corner of Hans Crescent to the west.

Another improvement is the provision of interchange facilities between the British Museum Station, on the Central London Railway, and Holborn Station, on the Piccadilly line.

International Tramway and Bus Association Holds Biennial Meeting at Warsaw

EUROPEAN transportation men found much of interest at the 22nd convention of the Union Internationale de Tramways, de Chemins de Fer d'Intérêt Local et de Transports Publics Automobiles (International Tramway and Bus Association) which was held at Warsaw, Poland, from June 29 to July 2.

The convention opened informally with a reception at the Polish National Club on Sunday evening, while the official opening was held the next morning in the salon of the Warsaw City Hall. The meetings were presided over by F. de Lancker, managing director of the Brussels Tramways, who is president of the association. Addresses were made by Alphonse de Kühn, minister of communications in Poland; Mr. Szpotanski, vice-president of the Municipal Council of Warsaw, and Mr. Budkiewicz, president of the Polish Union of Means of Transport. In these addresses, the history of Poland since the war was outlined, with particular reference to the plans for modernizing the country's transportation systems.

Technical sessions were held on Monday, Tuesday and Wednesday, both morning and afternoon. A number of papers on a wide range of topics were presented. A paper was read by E. Jayot, director general of extensions, Perfecture of the Department of the Seine, on the comparison of subways and surface lines. Dr. Wilhelm Pforr, general manager of the Berlin Transportation Company, presented a paper on braking tests, following up the work that was done by the committee reporting to the Rome convention two years ago.

At the Monday afternoon session was presented a report prepared by M. H. Coens, chief of substations and distribution of the Brussels Tramways and A. Allard, chief engineer of the Suburban Railways of Brussels, on the subjects of energy distribution for tramways and comparison between systems of conversion from high-tension alternating current to low-tension direct current. Another report presented was prepared by Gaetano d'Alo, traffic engineer of Milan, Italy, on the track structure. A paper was read by P. Lo Balbo, research director of the Piedmont, Italy, tramways, on storage battery vehicles for rail service in Europe.

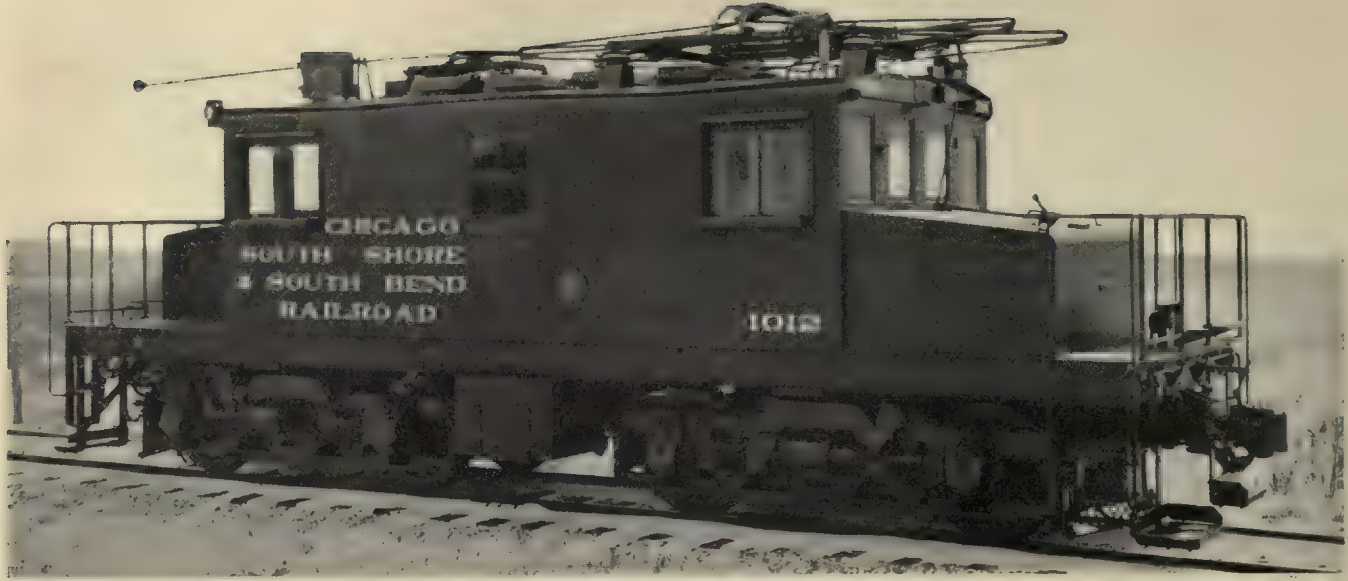
Two sessions were held on Tuesday, at which numerous reports were given. Dr. Philip Kremer, manager of the Frankfort a.M. Tramways, prepared a report on improvements in rolling stock for railways and road transport with respect to the comfort of passengers, facilities for service and improvement of operation. This report was a comprehensive review of recent European practice in car and bus design. H. Arnold, general manager, and F. Eichelhardt, chief engineer, both of the Vestischen Railway, Herten, Germany, reported on the use of internal combustion motors burning light oils for rail service. R. Podoski, professor of engineering at the Warsaw Polytechnic School, presented a paper on studies of electrolytic corrosion.

A report on the comparison of systems of co-ordinated transport including tramways, rapid transit lines and buses, was prepared by M. Nestrypke. A paper was read by M. Lange on automatic block signals for single track. Another paper was by L. Sekutowicz, Paris, on the use of light-weight metals in overhead line construction.

Wednesday's session opened with a discussion of the report by H. Werner, vice-director of the Vienna, Austria, tramways, on the development of electric equipment of rolling stock. This report was principally a tabulation of answers to a questionnaire relative to the design features of recent types of propulsion motors, especially those with high-speed armatures developed for the new types of drive. The last paper was that of L. Bacqueyrisse, general manager in charge of operation and technical service of the Société des Transports en Commun de la Region Parisienne, which operates all the transports in Paris, on methods of facilitating the use of the service by passengers on buses, tramways and rapid transit.

At the concluding session President de Lancker summed up the discussion which was held on the various papers and reports. It was decided to continue the preparation of information on the same subjects, to be presented at the next convention, which will be held at the Hague in 1932. Much interest was shown in regeneration of electric energy, and it is planned to make a special report on this subject. A special meeting probably will be held in Paris next October to witness tests of three cars fitted with regenerative equipment.

Following the meeting trips in Poland were taken by three groups of delegates. One of these was to the cities of Krakow and Katowice in Southern Poland, where many of the manufacturing plants are located. The three groups joined at Poznan on July 5 to assist in the formal opening of the International Exhibition of Transport and Touring being held in that city this summer.



This 85-ton locomotive has been built for service on 1,500 volts and 600 volts, both trolley and third rail

Double-Voltage Operation Features Midland Utilities Locomotive

Service can be given on 1,500 or 600-volt lines on its several subsidiary railways by changes of circuits and minor adjustments

By T. F. Perkinson
Transportation Engineering Department
General Electric Company

Two 85-ton direct current electric locomotives with novel features have been obtained by the Midland Utilities Company of Indiana for service on its various associated lines. During certain portions of the year they will be assigned to the 1,500-volt Chicago, South Shore & South Bend Railroad. At other times, when traffic demands require, they will be assigned to 600-volt associated properties, such as the Aurora, Elgin & Chicago Railroad, and the Chicago, North Shore & Milwaukee Railroad. These locomotives, constructed by the General Electric Company, are arranged for easy change-over of control circuits, auxiliary apparatus, etc., so that operation under a 1,500-volt or a 600-volt d.c. contact line or with a 600-volt third rail can be successfully undertaken.

Mechanically the locomotives are of the non-articulated double-truck type. The center plate of each truck is floating, supported by two transverse semi-elliptic springs suspended from the truck transom by centering hanger links. The transom casting is bolted to steel side frames which carry the pedestal jaws. The side equalizers are unusual, each being formed by two irregularly shaped forged steel plate bars. Two heavy coiled springs rest in cast pockets supported by the two plates forming the equalizer bar and carry the weight of the side frames with their superimposed loads. The wheels are 42-in., A.R.A. standard, with 3½-in. steel tires. The truck brake work is of the spreader type and is actuated by two cylinders, one mounted on each side of the truck frame. The Miner friction draft gear is used and couplers are of the standard A.R.A. type with 6x8-in. shank.

The cab superstructure is of the modified steeple type. The main cab has two operating compartments and an apparatus compartment with passageways on each side. All necessary control apparatus is in duplicate. Each operating cab has 4 kw. of electric heaters.

The center compartment contains the contactors, reverser, resistors, switches, control motor-generator set, etc., necessary for control of the traction motors. Access is obtained through a door from one of the operating compartments. The lower portion of the sides are covered with wire screening, giving a clear view of the apparatus and eliminating the danger of accidental contact with it. The top section of the compartment, containing the accelerating grids, has four transverse ventilators welded to the cab roof, giving natural circulation of air. Each auxiliary end cab houses an air compressor and a propulsion motor-blower set so located that a short direct path from the fan outlet into the longitudinal air duct is secured.

Four GE-704 d.c. series motors for 750 volts drive the wheels through single reduction gearing. These motors are of the box-frame, nose-suspended, forced-ventilated, commutating-pole type insulated for 1,500 volts. Air from the ventilating duct is led to each motor through an all-metal duct arranged to permit swiveling of the trucks. The air is taken in to the motor through an opening in the frame located above the commutator and passes out through protected openings at the pinion end.

The motor armature bearings and axle suspension bearings are of the waste-packed constant oil-level type.

The gears and pinions are of high-carbon steel, heat treated, and forged from solid steel blanks. The gears are of the non-resonant type,ringing being practically eliminated by the use of lubricant retaining rings inside the gear ring on either side of the web.

The control equipment is of the non-automatic electro-pneumatic type, arranged for multiple-unit operation. There are two motor combinations available for each direction of motion on either 600 or 1,500 volts. The first or low-speed combination has eight resistance steps, one full-field running step and one reduced field running step. The second or high-speed combination has seven resistance steps, one full field running step and one reduced field running step. The two groups of two motors each are connected in series on 1,500 volts, and in parallel on 750 or on 600 volts. The first combination connects two groups of motors in series, and the second connects them in parallel.

Principal Data of Double-Voltage Locomotives

Class of service	Freight and switching
Trolley voltage	1,500 or 600
Driving wheels, number	8
Driving wheels, diameter, in	42
Total weight, lb	170,000
Weight on driver, lb	170,000
Weight per axle, lb	42,500
Weight electrical equipment, lb	57,600
Weight air brake, lb	5,400
Weight mechanical equipment, lb	107,000
Length over knuckles	39 ft. 1½ in.
Width over arm rests	11 ft. 1½ in.
Height, trolleys locked down	14 ft. 0 in.
Total wheel base	27 ft. 0 in.
Rigid wheel base	8 ft. 8 in.
Type of control	PCL, multiple unit
Motors, number and type	Four GE-704-A-1
Gear ratio	71/18
*Continuous tractive effort, lb	16,800
*Continuous speed m.p.h	26.7
*Continuous current rating, amp	650
*Continuous output, hp	1,196
*One hour tractive effort, lb	22,600
*One hour speed, m.p.h	24.3
*One hour current rating, amp	800
*One hour output, hp	1,465
Starting tractive effort at 25% adhesion, lb	42,500

*Rating given on 1,500 volts at trolley, and motor fields shunted.

Manual knife-blade switches in the main circuits perform the following operations: Selection of trolley, pantograph, or third-rail shoes; connection of the main and auxiliary circuits to the bus line couplers; connection of the traction motor circuits to the source of energy; isolation of individual pairs of traction motors in the event of damage.

Master controllers are of the recently developed cam-operated type. In this the operating lever causes a camshaft to revolve, opening or closing individual contactors in a manner similar to that found in the conventional type of pneumatic cam-operated main-motor controllers used for multiple-unit car service. The reserver handle is mechanically interlocked with the main handle.

Protection for the electrical equipment is afforded by an inclosed expulsion type fuse in the main circuit ahead of the main switch and auxiliary fuse. Individual motors are protected by a series overload relay.

Control equipment and resistors are compactly mounted in a compartment in the center of the locomotive cab

When the locomotives are assigned to territories with different operating voltages, change-over of the main circuits from 1,500 to 600 volt operation, or vice versa, is facilitated by terminal boards to which the motor and grid connections are brought.

There are two traction motor-blower sets, each consisting of a 1,500-volt d.c. motor driving a multivane blower. Each set furnishes air to the pair of motors located in the truck beneath it. The blower motor field coils, armature, brushes, and brush-holders are interchangeable with those of the compressor motors.

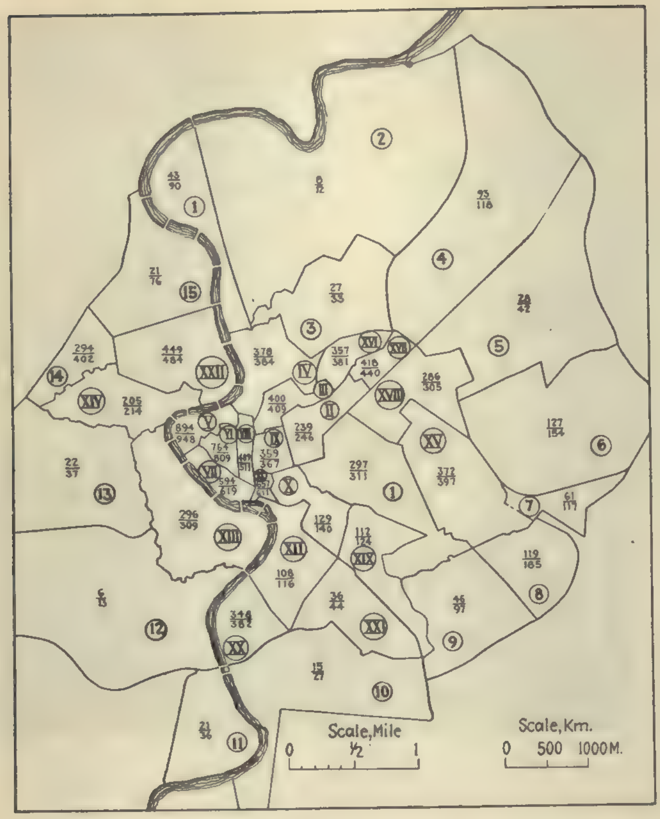
The two compressors are of the CP-130, 1,500-volt type, and are designed to deliver 50 cu.ft. of free air per minute each when pumping against a reservoir pressure of 90 lb. per square inch. The compressors are of the single-acting, single-stage type with horizontal cylinders. When the locomotives are asigned to 600-volt territory the compressor motors, blower motors, and the motor of the control motor-generator set will be provided with armatures, field coils and brush rigging differing in electrical characteristics from, but physically interchangeable with, these parts furnished for 1,500-volt operation. Control and lighting energy is furnished by a 2 kw. 1,500/32-volt motor-generator set, which floats across and charges a 200 amp.-hr. "Exide" battery.

Bus line coupler sockets, plugs and jumpers permit emergency operation of two locomotives by means of power furnished solely from either.

The air brake equipment is of the straight and automatic type manufactured by the Westinghouse Air Brake Company. Each truck has two 10x12-in. brake cylinders mounted on the truck frames and working the brakes for each adjacent pair of wheels. Two air tanks suspended beneath the platform and between the trucks have a total capacity of 43,000 cu.in.

Rome to Have MODERN

Construction of rapid transit line will provide direct routes connecting the principal points in the center of the city with six outlying terminals. It will round out a unified transportation system in which surface cars serve the major portion of the city with buses in the congested central area



Rome population density by districts, 1921 and 1927

The population density is given in inhabitants per hectare, a hectare being equal to 2.47 acres. The upper figure is the density in 1921, the lower is the density in 1927. Roman numbers in circles designate rioni (wards) in the central city and Arabic numerals in circles designate quartieri (districts) in the outer territory now also included in the city of Rome

RAPID transit for the city of Rome, Italy, has been brought much nearer by the preparation of detailed plans for a subway system which are now being studied by the Superior Council of Public Works. The project calls for three lines with a total of 15¼ miles of route. It is estimated that construction work can be completed in 12 years. Additional lines totaling 19½ miles, proposed for later construction, to round out the system, could be completed in 25 years.

Of the three routes included in the first group, as shown on the map, A, the one proposed for immediate construction, is from Piazza Verbano to the Ostia railroad station, with a branch from Porta Pia to Sant' Agnese. The second is that portion of route C between Piazza Re di Roma to Stazione Termini, followed by the remainder of the line C, from Stazione Termini to Viale delle Milizie. Finally, route B would be built from Viale delle Belle Arti to the Ostia station.

These plans are the result of proposals which date back to 1924. In Italy, a city railway entirely within a municipality is under the jurisdiction of the local government, except in the city of Rome, in which all rights are reserved to the national government. In August, 1926, the Minister of Public Works appointed the technical committee to plan a rapid transit system, which has just rendered the report under consideration.

In making the survey, two purposes were kept in view. First was the relief of traffic congestion in the center of the city. This area has winding streets cramped between buildings whose historic and artistic character prohibits removal or modification to provide wider roadways. With the increasing use of automobiles, traffic jams have become so bad that vehicle movement is almost impossible. The second purpose was to permit a redistribution of the population so that more people can reside in the outer districts. The need for this will be seen from the population maps, which give the number of inhabitants per hectare for the wards (rione) of the older central city and the corresponding districts (quartiere) of the outer section.

It will be seen that the three rapid transit lines proposed will skirt the heart of the city, joining Stazione Termini, Piazza Colonna and Piazza Venezia, with six branches extending toward the most important outlying districts. In order to promote flexibility of routing, track connections will be made at two points, Piazza Venezia and Stazione Termini.

Selecting the Type of Tunnel

Shallow subways built by the cut-and-cover method were rejected, in part on account of the cost. It was also considered inadvisable to disturb sections of the ground which might contain material of archaeological importance. Accordingly, the plans have been prepared for the tunneling method such as is used in railroad construction. Toward the outer ends of the line, however, the plans call for shallow subways using the cut-and-cover method. In the lowest section of the city, in the vicinity of the Tiber River, it was decided to use the shield method of tunneling, the tubes being lined with sectional cast-iron rings.

It was deemed inadvisable to adopt special sections for the tube tunnels which differ from those used successfully in Paris and New York. The section shown in one of the illustrations was adopted where possible, and the portion built by the tunneling method is shown in another illustration.

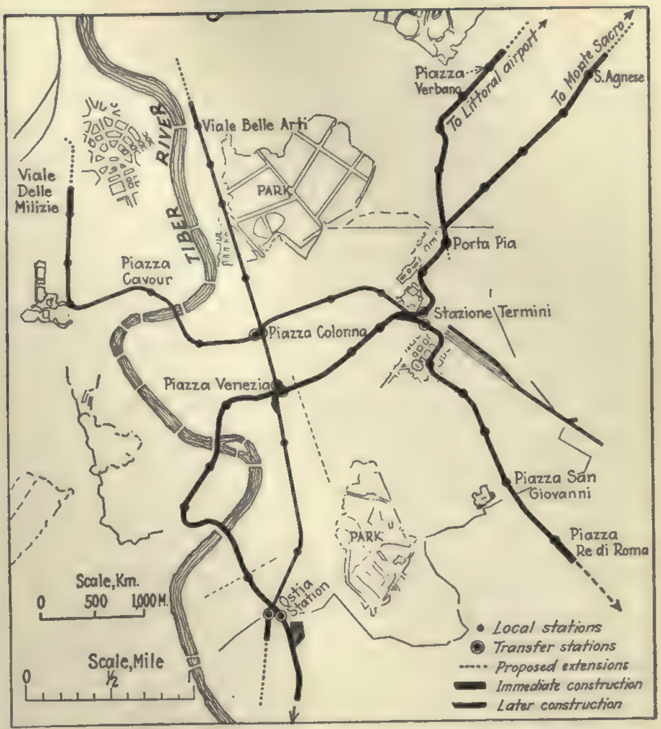
Many test borings along the proposed route indicated that in general there is a superficial layer of soil varying from 7 to 46 ft. In the higher portions of the city there is a stratum of volcanic earth, below which are blue

SUBWAY

By

Engineer Ugo Vallecchi

Director of Traffic and of the Technical Office for the Subway System, Rome, Italy



Map of proposed Rome subway system

The main line *A* is 8.603 km. long, with the branch between Porta Pia and Santa Agnese 2.262 km.; line *B* is 5.410 km. long, and line *C* is 7.944 km. long. In addition, connecting tracks of 0.236 km. are planned, making the total length 24.455 km.

marls and clays. In the lower sections are blue and yellow marls and mixtures of clay and sand. Along the Tiber are large sandy pockets which it is feared may be difficult to handle during the tunneling

While in general the streets are followed, it has been found possible to hold to a minimum radius of 75 m. (246 ft.), limited in general to track at the ends of stations. This radius has made it possible to adopt a car width considerably greater than that used in the Paris subway, without increasing the dimensions of the masonry tunnel or the cast-iron tubes at curves of minimum radius.

In this connection a study of the maximum permissible speed was made. With stations about 500 m. (1,650 ft.) apart, it was found that a maximum speed necessary to give good schedules was 60 km.p.h. (37.3 m.p.h). It was decided to use a super-elevation of 17 cm. on curves as the maximum. This permits a speed of 37.7 km.p.h. on a 75-m. radius, 45.4 km.p.h. on a 100-m. radius and 59 km.p.h. on a 150-m. radius. The lines also have been laid out so that a straight section of at least 80 m. is left between tangents to circular curves, permitting parabolic easements, with intermediate horizontal straight track capable of containing the four axles of a car between curves.

The maximum gradient is 3.8 per cent at one point on line A and 3.7 per cent at one point on line C.

A study of the use of approach grades at the entrances and exits to stations, calculated for a straight section of track 500 m. long, showed a 22 per cent economy in energy consumption, a 13 per cent reduction in motive power and a saving in time of 4 per cent. These advantages were found to be offset by the increased difficulty of subway construction, the greater exposure to infiltration of water and the impossibility of running express trains and local trains on the same track. The topography also made it impossible to put more than two consecutive stations at the same level. A compromise profile adopted obtains a portion of the advantages of the approach grades.

CONSIDERING LOCATION OF STATIONS

It was desired to keep the distance between stations as great as possible, in order to save construction costs, obtain maximum schedule speeds and simplify construction. A study of various systems showed that in Paris the distance between stations varies from 600 m. to 425 m.; in London it is about ½ mile; in Madrid it is close to 500 m.; in Hamburg, 750 m.; in Berlin it varies from 500 to 1,200 m. The distances adopted for Rome average about 550 m. (0.34 mile).

In determining the length of a station, the possibility of operating long trains was set off against the financial necessity of investing as little money as possible for future demands. The normal length of stations finally adopted is 80 m. (264 ft.). This is based on the assumption that the cars will have an over-all length between buffers of 15.2 m. (50 ft.). Five-car trains would be 76 m. (250 ft.) long, and would have ample clearance, while six-car trains, with an over-all length of 90.5 (300 ft.) could also be used with the front and rear doors of the trains closed.

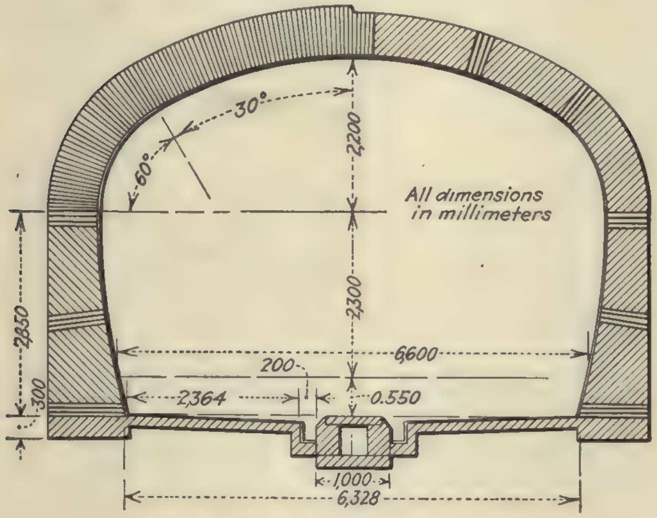
Cars with the dimensions proposed will have a normal capacity of about 150 passengers. A six-car train, then, will have a total capacity of about 900 persons. With a maximum frequency of 90 seconds, there will be a capacity of 36,000 passengers per hour, or for an operating period of 20 hr. per day, an ultimate capacity of 780,000 passengers in each direction.

INDEPENDENT STATION PLATFORMS ADOPTED

A study of the system of separate platforms on the outside of the track as compared with island platforms was made. In Paris, Madrid, Barcelona and Tokio, outside platforms are used exclusively. In Berlin and Hamburg island platforms are used. In London the ordinary lines have outside platforms, while in the tubes central platforms are standard. Island platforms reduce the total width of the station and simplify the stairways, but lead to interference between incoming and outgoing passengers and, in general, limit the volume of traffic that can be handled expeditiously. It is believed that shorter stops can be made with outside platforms, and passenger travel is confined to one direction. In Paris, the stops average between ten and fifteen seconds, and even in the principal stations seldom exceed twenty seconds, whereas in Berlin the stops equal or exceed double these values. The use of central platforms also involves insertion of curves on each track at each end of the station.

SELECTION OF ROLLING STOCK

Limiting dimensions of rolling stock are fixed by the subway section. The selection of an internal diameter of 7.3 m. (24 ft.) for the cast-iron tubes thus determines the dimensions of the car. As to clearances it was found that in the Paris subways a clearance between passing trains of 50 cm. was adopted to allow passengers to walk along the tunnel in the event of accident. The adoption of cars with intercommunicating doors, as in the London and German subways, however, makes these clearances entirely unnecessary. Hence it was decided to adopt the dimensions for rolling stock in effect on the principal routes of the Italian State Railways. The minimum clearances between cars on adjacent tracks are 300 mm. (10.8 in.) and 150 mm. (5.4 in.) in a horizontal direction between cars and stationary obstructions. Dimensions of the cars adopted are shown in the illustration. The reduction in width at the ends provides clearance on the curves with 75 m. radius.



Typical section of Rome subway

Adoption of wheels of 900-mm. (35½-in.) diameter allows the future adoption of motors somewhat more powerful than those previously planned, and gives a height of car platforms of 1.06 m. (41¾ in.) with a clearance of 103 mm. (4 in.) between the wheel and the bottom of the car floor. With station platforms 1 m. (39.4 in.) above the rail level there is a difference of 6 cm. ($2\frac{5}{16}$ in.) between the platform and the floor of the empty car. All cars, both motor and trailer, have been designed alike. The couplers will be indentical so that it will necessitate only the addition of electrical equipment to convert the trailers to motor cars, if later developments require.

The principal dimensions of the cars are given in the accompanying table.

The general appearance of the cars is indicated in the plan. There will be three doors on each side, 1.5 m. (4 ft. 11 in.) wide. These doors will be of the double sliding type, automatically operated.

Longitudinal arrangement of the seats was adopted to give easier circulation of passengers in the car and to allow better lighting. Since it is proposed, at least experimentally, to provide for two classes of passengers, the trailers can be divided into two parts, permitting one to be finished and upholstered for first-class service.

The seating capacity of the cars is normally 32. There are places for 121 standing passengers in the motor cars. The trailers will have 36 seats and 119 standing passengers. A normal train of five cars will then have capacity for 771 passengers, of whom 168 are seated. The weight will be 184 kg. (405 lb.) per place offered.

Ventilation will be provided by opening the upper section of the windows, or by means of automatic suction fans. This was considered preferable to the use of a monitor deck, being less expensive, more substantial, and better in appearance. The normal train will consist of three motor cars and two trailers, alternating. Until the necessity for greater capacity arises, three-car trains, consisting of two motor cars with a trailer between, will be used. Automatic couplers will make mechanical, air and electric connections between cars.

SUBSTANTIAL TRACK CONSTRUCTION PROPOSED

The track will be constructed with Italian State Railway standard rail type FF.SS, weighing 50.6 kg. per lin. m. (102 lb. per yd.), laid on oak crossties, 26 being used in each section of 18 m. This corresponds to a spacing of 27¼ in. Every fifth crosstie will be extended to support the third rail. The same type of track has been adopted not only for the main lines, but also in the stations. In the carhouses and yards, as well as on side tracks rail weighing 36 kg. per m. (73 lb. per yd.) will be used, with 24 crossties for every 18-m. section. On curves of 300-m. radius or less, inside guard rails will be used. The ballast will be made up of gravel and will have a depth of 55 cm.

750-VOLT THIRD-RAIL SYSTEM USED

It is proposed to use the 750-volt direct current system. Although the 3,000-volt d.c. system will be used for future railroad electrification in Italy, it was felt that the clearances with low voltage would be less and that the saving in cost in the distribution system would not have offset the higher cost of the equipment and its maintenance. It was pointed out that with few exceptions all other rapid transit lines in the world use between 800 and 600 volts. One Barcelona rapid transit line uses 1,700 volts for the third rail and the other 1,400 volts with overhead trolley. The Nord-Sud line in Paris has a three-wire system at 1,200 volts, but only 600 volts between each third rail and the return wire. In Berlin and Hamburg 800 volts are used with the third rail. All the other rapid transit systems, including those in America, Paris, Madrid, and Tokio, employ 600 volts. Of these the one in Madrid is the only one using an overhead contact line.

All calculations of motor power were based on the use of a standard train of three motor cars and two

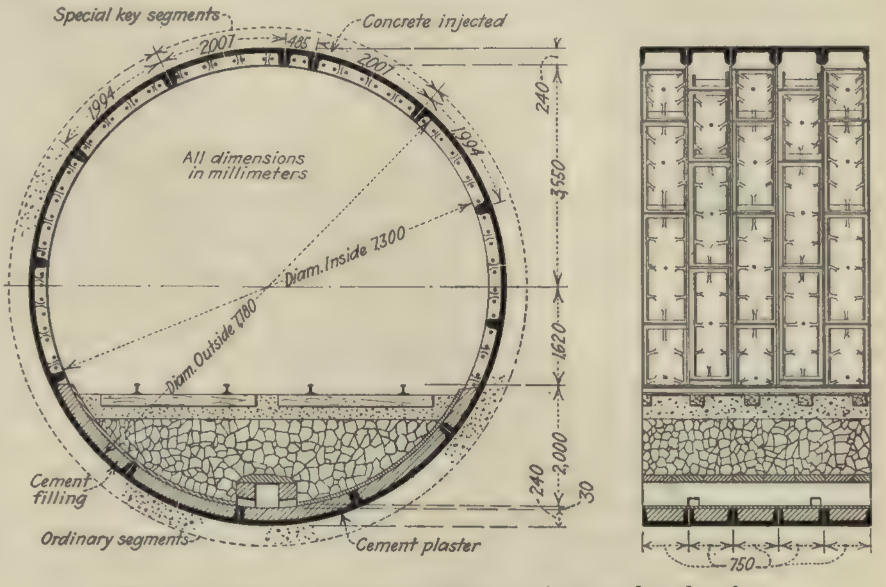
Principal Dimensions, Rome Subway Cars, as Proposed

	Meters	Feet and Inche
Length of body	.14.5	47–7
Width of body	2.6	8–6⅜
Height, rail to roof	3.3	10–10
Rigid wheelbase	10.0	32–9¾
Truck wheelbase	2.3	7–6½
Length over buffers	15.2	49–10⅜
Weight of motor car, metric tons (2,204 lb.)		34
Weight of trailer car, metric tons		20

trailers weighing 178 metric tons. The braking rate is assumed at 0.85 meters per second (1.9 m.p.h.p.s.). It is planned to use automatic acceleration and, with an adhesion coefficient of 18 per cent, to reach a speed of 40 km. per hour (25 m.p.h.) in 14 seconds. This calls for an average acceleration up to full motor voltage of 0.8 meters per second per second (1.8 m.p.h.p.s.) and a maximum acceleration of 1.15 meters per second per second (2.6 m.p.h.p.s.). On this basis the type of motors adopted has a one-hour rating of 170 hp. at 750 volts and a continuous rating of 130 hp. at 750 volts. There will be four such motors per motor car, with pairs connected permanentaly in parallel. Electro-pneumatic control will be employed and remote electro-pneumatic devices will govern the action of the third-rail shoes and motor compressors. Each motor car will have a switchboard in the cab at each end. No control equipment is included on the trailers. Multiple-unit control will be used and the trains can be operated from any cab.

The car lighting will be from the 750-volt supply, with an emergency storage battery circuit. Quick-acting air brakes will be employed, with two brake shoes on each wheel.

Electric power will be supplied by a third rail of special steel located between tracks. Copper feeders will be connected to the third rail at each station, by remote control switches. The track will form the return circuit, with inductive bonds so as not to interfere with the signal circuits. The feeders were calculated on the basis of standard operation with three-car trains at intervals of two minutes 30 seconds, while by using the reserve equipment in the substations it will be possible to run either with trains of five cars at the same headway or with trains of three cars at 90 seconds headway.



Section of tunnel of concentric cast-iron rings used under the Tiber River and at other points

Power will be converted in five substations with a total installed capacity of 30,000 kw., of which 10,000 kw. normally will be held in reserve. An investigation is being conducted to determine the feasibility of using mercury vapor converters instead of rotary converters, and doing so in connection with the regeneration of energy on motor cars.

The substations will be fed from two three-phase lines at 8,200 volts and 45 cycles. For the first line to be placed in service there have also been provided two storage batteries of a total capacity of 1,000 amp.-hr. for discharge in ten minutes, and an average potential of 500 volts. In the event of an interruption in the supply, these batteries will enable any train which may be between stations to reach the nearest stop. These batteries are also connected to the emergency lighting circuits of the stations and of the line.

The block signal installation was designed to permit a frequency of 40 trains per hour, or a headway of 90 seconds. All signals will be of the color-light type. Caution signals will be installed only where the stop signal may not be visible at a sufficient distance for the motorman to stop his train when proceeding at maximum speed.

An automatic train stop will set the brakes and cut off current from the motors of any train that may pass the signal. At the entrance to each station, a safety signal will be located at such a distance from the end of the platform or switch point that a train whose brake has been set by the automatic stop will positively be stopped before running into a standing train in the station. Each station will also have departure signals at the leaving end of the platform. The automatic block signals will show normal clear indications, while the interlocking signals will show normal stop indications and must be cleared for the passage of each train. The signal system adopted is controlled by alternating current in the track circuits. The track circuits, control circuits, automatic stop devices and lamps will be fed by three-phase current of 220 volts. Communication between stations, switch cabins, substations and depots will be by means of a telephone system.

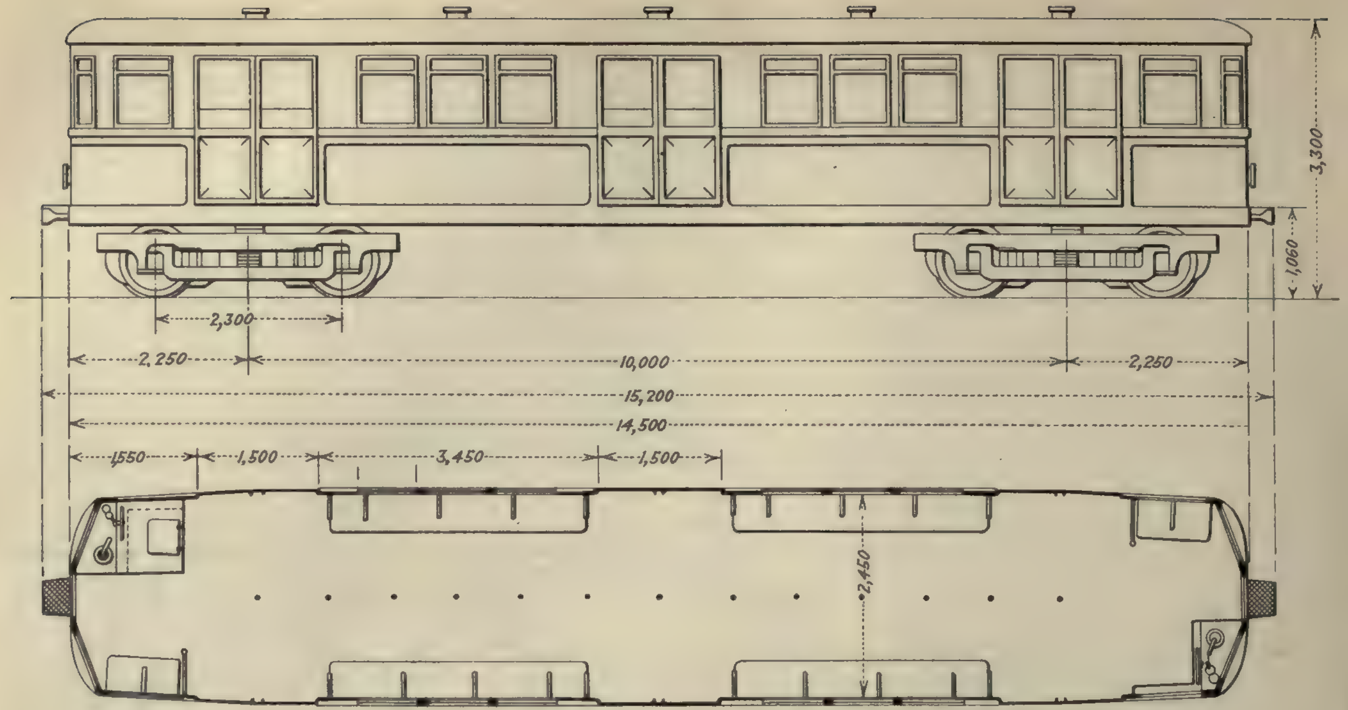
The subway will normally be unlighted. If the current fails an emergency lighting system fed by the storage batteries will be cut in automatically so that passengers may be able to make their exit. An independent system of emergency lighting fed from a separate storage battery will be installed in the stations.

Along each track there will be a pair of exposed telephone wires. By bringing them into contact the automatic switches in the substation will be actuated. The same two wires can be used by the train crew to communicate with substations by means of a portable telephone set. Fire extinguishers will be placed in stations and along the line, their location being indicated by blue lamps fed from the signal circuit. Special switches in the stations will permit the crew to set the signals against movement, in the event of a blocked track.

Shops and Car Storage

Adjacent to the terminal on line A, adjoining the station of the Rome-Ostia line of the state railway, will be the carhouse and shops. Two large adjoining carhouses, 84 m. by 21 m. each, will contain twelve storage tracks, eleven of which are provided with pits for the inspection of the cars. Each track will accommodate a five-car train, making the total capacity 60 cars.

The main repair shop will be placed back of the storage house, being separated by transfer tracks. The shops will have a series of seven bays and will cover 4,400



All dimensions in millimeters

Proposed car for the Rome Subway

Motor and trailer cars will be identical in general dimensions. Control equipment will be placed on motor cars only

sq.m. (47,000 sq.ft.). For six of the bays, intended for repairs on rolling stock, a transverse crane is provided. The remaining bay is reserved for servicing of the lines, tracks, electrical system, signals and miscellaneous work. In front of these bays is to be a two-story building, 2,320 sq.m. (25,000 sq.ft.) in area. On the ground floor will be rooms for the machinery, tools and miscellaneous equipment connected with car repairs. The second floor will contain the administration offices and space for lodgings for officials. The storehouse will be in the end of the shop and office buildings and in the adjacent yards.

There will be a yard with a total area of 4,900 sq.m. (50,000 sq.ft.) in which material necessary for operation will be received. This yard will be served by tracks of the city surface line and through a connecting spur by the state railway system. The storage yard will be served by a gantry crane permitting direct unloading from the cars. There will also be a small storage yard, equipped with pits, and shops for routine night inspections in the terminal stations and in the station at Piazza del Cinquecento on line A.

The proposed schedule calls for the operation of three-car trains on a headway of two minutes 30 seconds. During hours of light traffic the service will be on a five-minute headway. The first runs will start at 5:30 a.m. and the last run will end at 1 a.m. The program calls for the operation of trains with a total capacity of 11,000 passengers per hour in each direction during the rush period. This schedule contemplates the absorption of the business at present handled on the surface cars, so that the plan of co-ordinating the subway system with the present surface car system will be complete.

The construction program provides for the completion of route A within six years. In the two years following the section of route C between Stazione Termini and Piazza Re di Roma should be completed. This will establish rapid transit communication between the center of the city and Piazza San Giovanni, to which point will be transferred the terminal station of the railway to Castelli Romani. In the four years following the second section of route C and all of route B should be built.

The costs of construction and equipment, including damages and allowing for contingencies, are estimated as follows:

	Lire	Dollars
Route A (10.865 km.)	300,000,000	15,750,000
Route C (section between Stazione Termini and Piazza Re di Roma, 3.036 km.)	70,000,000	3,675,000
Route C (section between Viale delle Milizie and Stazione Termini, 4.908 km.)	170,000,000	8,925,000
Route B (5.410 km.)	155,000,000	8,137,500
Total	695,000,000	36,487,500

In order to assure a sufficient return on the capital stock, assistance on the part of the state will be necessary. It is proposed that the state should guarantee the interest on an issue of bonds for an amount corresponding to about two-thirds of the total cost of the work which is equivalent to 90 per cent of the cost of the sub-structure. At the expiration of the franchise, 50 years, or in the contingency of appropriation of the system, the state would naturally become the owner of the sub-structure. The state would also be entitled to participation in the net profits.

Calculations indicate that the remaining routes, including the first portion of route C, can be carried on without further assistance from the state.

Growth of Population in Rome, 1921-1927

	1921	1927
Rioni (wards of central city)	451,097	477,206
Quartieri (districts) of outer city	152,312	236,751
		5,026
Total	603,409	718,983
Suburban districts	28,205	57,064
Agricultural districts	34,426	54,628
Total exclusive of garrisons	666,100	830,675
Garrisons	25,561	17 444
Total population of Roman district	691,661	848,119
Average population (inhabitants per hectare) of rioni and quartieri, exclusive of garrisons	115	135

Long Poles Made by Splicing

DUE to the extension of the Bronx River Parkway under 232nd Street, the foundations of some of the span wire poles used by the Third Avenue Railway System, New York, were removed. Two novel methods of supporting the overhead construction were adopted. One was to support both wires by a horizontal arm attached to the pole on the side opposite the railroad cut. An extension approximately 12 ft. long was made to this pole by means of a malleable iron reinforcing clamp. From the top of the lengthened pole guy wires were attached to support the horizontal arm, as shown in an accompanying illustration. This arm projected back a short distance over the sidewalk and was guyed at that end as well as at the long end.

At left—Pole lengthened by splicing to support horizontal arm for attaching trolley wires on Webster Avenue. At right—Extra long pole made by splicing two ordinary poles together with reinforcing clamp

The other method used to support the trolley overhead was the erection of a 60-ft. pole, the foundation of which was in the new cut. To obtain a pole of this length the railway took two ordinary 30-ft. poles and placed one upside down on top of the other, joining them by a malleable iron reinforcing clamp.

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Portable Rack for Special Bus Tools*

By Stewart Palmer
Foreman Berea Garage
Cleveland Railway

TO SPEED UP bus inspection a semi-portable tool stand is used at the Berea Road Garage of the Cleveland Railway to hold all special wrenches needed, as well as a supply of nuts, bolts, lamp bulbs and other small items necessary for this kind of work. The stand is placed between two pits where it is readily accessible for the mechanics working in each inspection pit. This material would normally be kept in the stockroom but because the same work is performed in these two pits continually, it is more economical to place special tools and equipment on the floor. At the close of the inspection period, the rack is moved into the stockroom.

Rack for special bus tools and equipment speeds up the work in garages of the Cleveland Railway

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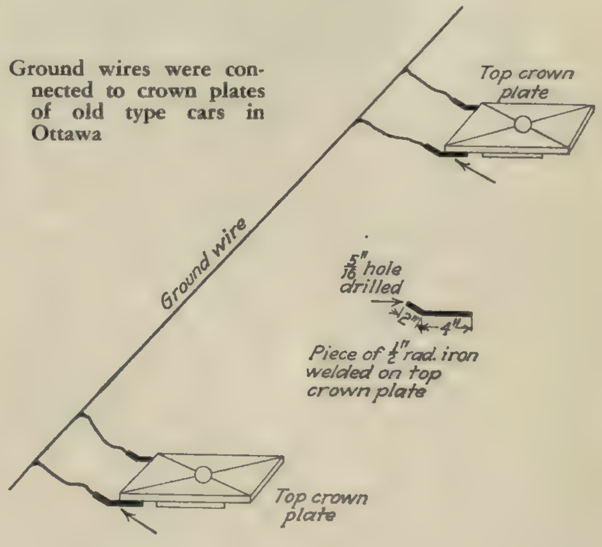
Cars Grounded on Crown Plate*

By J. Munford
Electrical Foreman
Ottawa Electric Railway, Ottawa, Canada

DIFFICULTY has been experienced in Ottawa to keep ground wire connections tight on old type cars, cars frequently being pushed in dead on account of this failure. To overcome this, four pieces of $\frac{1}{2}$-in. round iron 6 in. long were cut and bent at 45 deg. at a distance of 2 in. from one end. A $\frac{5}{16}$-in. hole was drilled in the short end and tinned. This iron ground connection was then welded on the long end to the top crown plate, with the tinned holes upward to retain the solder while the taps from the main ground wire were being soldered in place. Since this installation none of these ground connections has given any trouble.



Top crown plate
Ground wire
$\frac{5}{16}$" hole drilled
$\frac{1}{2}$"
4"
Piece of $\frac{1}{2}$" rnd. iron welded on top crown plate
Top crown plate

Ground wires were connected to crown plates of old type cars in Ottawa

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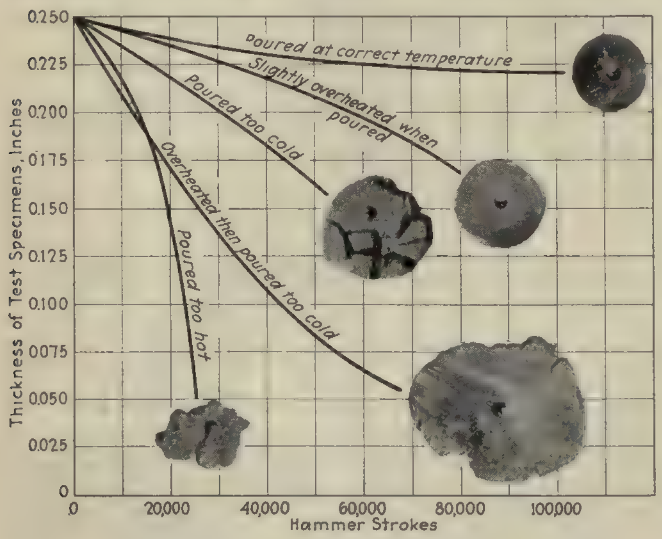
*Submitted in Electrical Railway Journal *Prize Contest.*

Tests Show Importance of Correct Babbitting

By J. S. Dean
Renewal Parts Engineer
Westinghouse Electric & Manufacturing Company

BABBITT metal commonly used for lining bearing shells was originally a composition of 89.3 per cent tin, 3.6 per cent copper and 7.1 per cent antimony. More recently a great variety of bearing metals have been brought out under different trade names.

In general, the various babbitt metals used in railway motors are divided into two distinct classes, known as tin base and lead base alloys. They usually contain from 80 to 90 per cent tin or lead respectively as their fundamental element. Both classes give good results in service when properly handled during the melting and pouring process while babbitting the bearing shells. Most electric railway operators seem to favor the use of the tin base alloy for armature and axle bearings, although a few have tried the less expensive lead base alloy as an experiment with good success.



Results of hammer tests of babbitt metal poured under various conditions

To show the variety of materials used in some of the well-known babbitt metals, the following table represents five different brands of tin and lead base alloys commonly used:

Composition of Babbitt Metals

Tin Base Alloy					Lead Base Alloy				
	Per Cent					Per Cent			
Sample	Tin	Copper	Antimony		Sample	Lead	Copper	Antimony	Tin
(1)	85	7.5	7.5		(1)	64	1	14.4	20.6
(2)	83.0	5.0	12.0		(2)	81.3	1.8	11.4	5.5
(3)	*89.3	3.6	7.1		(3)	76.2	.2	14.4	9.2
(4)	90.0	2.0	8.0		(4)	82.3	.2	16.6	.9
(5)	83.4	8.3	8.3		(5)	79.5	.8	19.5	.2

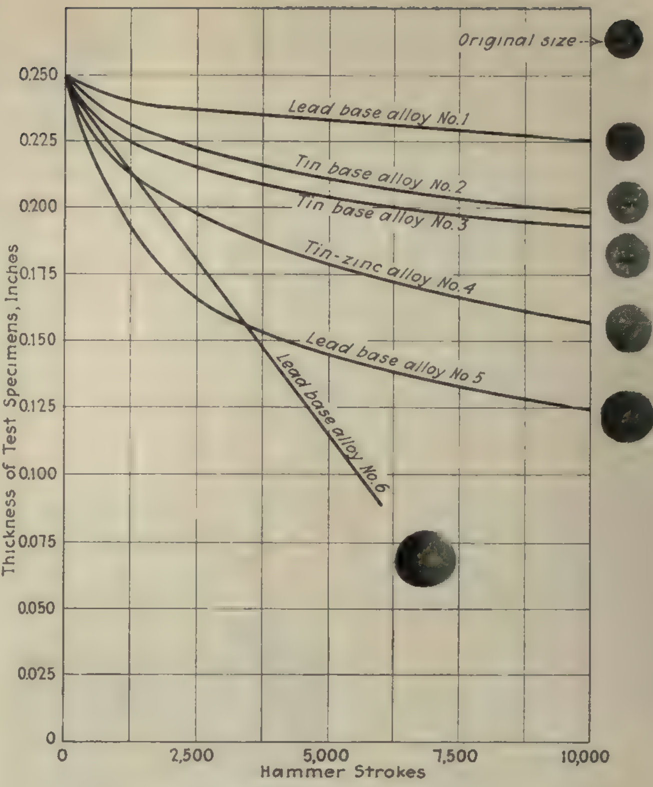
*Original formula of Isaac Babbitt.

The mechanical strength of the two different types of alloy are shown in the following table:

Strength Tests of Babbitt Metals

	Ultimate Stress		Elastic Limit			
Class of Alloy	Tension	Compression	Tension	Compression	Per Cent Elongation in 2 In.	Brinnell Hardness
Tin base.....	11,875	16,800	5,000	7,000	5.5	*30
Lead base....	10,900	14,500	3,200	3,000	1.0	*24

*These tests were made on sample specimens 2 in. in diameter and ½ in. thick



Results of hammer tests of babbitt metal of various compositions

The results of vibration and pounding tests made on a number of sample bearing shells which were babbitt lined, tin and lead base alloys being used, show interesting results. Tests made on bearing shells (tinned before babbitting) show that a tin base alloy resists failure due to pounding and vibration 2½ times better than a lead base alloy. Similar tests made on bearing shells (not tinned before babbitting) show that a tin base alloy resists failure due to pounding and vibration five times better than a lead base alloy. These bearings were subjected to two different tests. In the first test the bearing was mounted in a specially designed hammer machine which pounded the flange of the bearing. In the second test a special vibration testing machine was used which delivered a series of rapid vibrations to the body of the bearing shell.

Test pieces of babbitt metal of 1 in. diameter and ¼ in. thickness were prepared and subjected to a series of hammer blows, after which the thickness of the pieces was measured and the corresponding number of strokes recorded. Results of these tests show the importance of pouring babbitt metal at the proper temperature, as may be seen from the accompanying curves.

Results of actual service tests made on railway motor armature bearings lined with an approved grade of tin and lead base alloy show that either class of these babbitt metals will operate satisfactorily in service. The following figures were obtained from actual service bearings:

Service Tests of Babbitt Metals

Kind of Service	Babbitt Lining	Armature Location	Actual Mileage	Maximum Wear
City.........	Tin base	Pinion end	290,000	0.061 in.
City.........	Tin base	Commutation end	290,000	.006 in.
Interurban.	Lead base	Pinion end	240,000	.028 in.
Interurban.	Lead base	Commutation end	240,000	.037 in.
City.........	Tin base	Pinion end	374,900	.075 in.
City.........	Tin base	Commutation end	374,900	.025 in.

Temporary crossover used by the Cleveland Railway is easily and cheaply installed

Economical Overhead for Temporary Crossovers*

By Angus G. Scott
Assistant Superintendent of Overhead Lines
Cleveland Railway

ERECTION of overhead crossings over portable track crossovers is facilitated at Cleveland by the use of a $2\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x 12 ft. board, which acts as an intermediate span wire. This board is provided with three barn hangers which move freely back and forth. The first step in erecting a temporary crossover is to install a frog over each switch. The frogs are then connected by a short piece of $\frac{5}{16}$-in. or $\frac{3}{8}$-in. stranded span wire which is prevented from sagging and is kept in alignment by the hanger on the board. Reclaimed ears, frogs and wire are used in the installation of such a temporary overhead crossover. This device can be installed in about 30 minutes at a saving of approximately $3 in labor costs alone, as compared with the old method of installing overhead crossovers.

◆

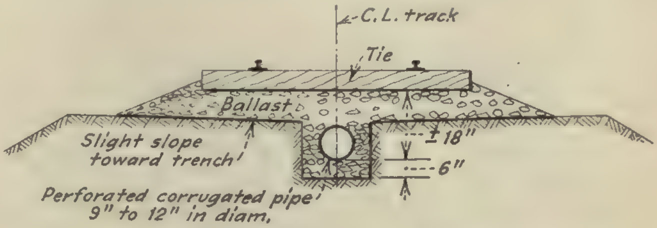
Center Subdrainage System Reduces Track Maintenance Cost

DRAINS placed directly under the center of the electric railway track of the East Bay division, Southern Pacific Company, Berkeley, Cal., have lessened track maintenance work and insured better riding qualities. The installation of these drains is part of an extensive improvement program which has been in progress for some time past. The project involves the complete reconstruction of the track using 90-lb. T-rail with creosoted ties on rock ballast.

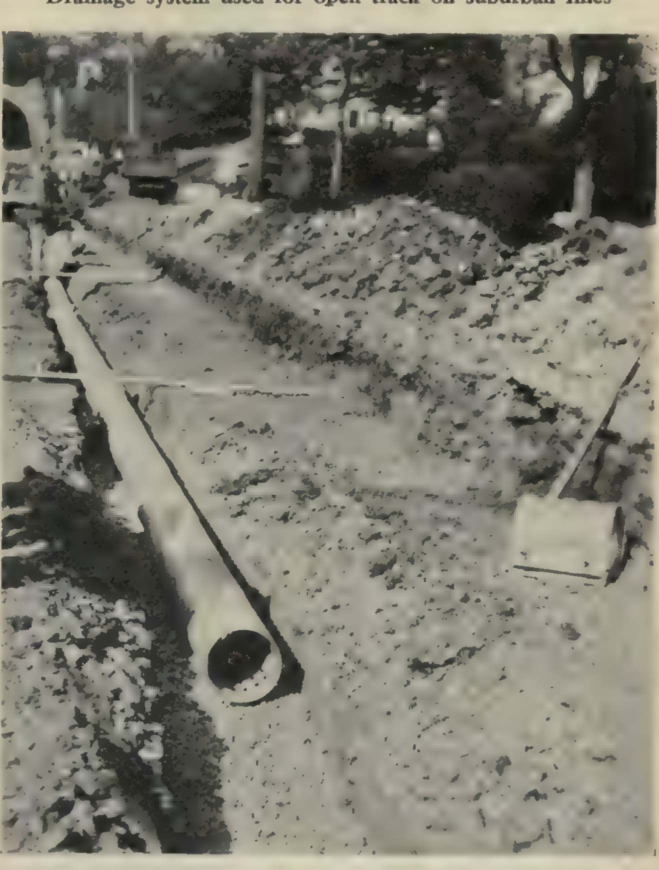
Poor drainage conditions on the old track had been a fruitful cause of low and pumping joints, bumpy surface and heaved pavement. To safeguard against such conditions on the new construction, a system of center subdrainage was designed. Placing of the drains under the center of each track is believed to have several advantages over the old method of placing subdrains to the side of and between tracks. By placing the drains in the center, sloping the subgrade slightly toward the trench and using a pervious backfill, one line of drain is sufficient to remove water quickly before it has a chance to lessen the bearing power of the soil. A drain so placed stabilizes the soil supporting the track and its weight of traffic.

However, successful use of this design demands a drain of considerable strength if it is to bear without breakage the shock and impact of traffic. Even where it is desired to lower the water table and the drain is placed at such a depth that the impact factor becomes of less consequence than the dead load, a non-crushable drain of continuous construction which will not disjoint in unstable and shifting soils is necessary to avoid costly replacement work.

The trench was excavated to a width of from 9 to 12 in. greater than the diameter of the pipe, to permit careful tamping of the rock backfill around the pipe. The trench depth was maintained at 6 in. below


C.L. track
Tie
Ballast
Slight slope toward trench
±18"
6"
Perforated corrugated pipe 9" to 12" in diam.

Drainage system used for open track on suburban lines



Perforated iron pipe on a 6-in. layer of coarse rock used for track drainage in Berkeley, Cal., by East Bay division of Southern Pacific Company

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**Submitted in* Electric Railway Journal *Prize Contest.*

the flow line to provide for a bed of crushed rock below the pipe. The flow line was kept at approximately 18 in. below the ties, varying somewhat because of the grade. Where it was necessary to lower the water table this depth was increased to any desired depth for which it was possible to secure an outlet. The rock backfill was carried to the top of the trench, where it became integral with the ballast section. It is considered to be highly essential that rock backfill be used to the top, in order that direct and rapid interception of run-off, rather than slow percolation through soil, will result. The surface of the subgrade was sloped slightly toward the trench for the same reason. In general it was decided to install a drainage system conforming to this design over originally swampy land, through cuts or side-hill sections, or where adobe pockets in the original fills were impounding water.

◆

Testing of Field Coils*

By C. B. Hall

Chief Clerk Mechanical Department
Virginia Electric & Power Company, Norfolk, Va.

SIMPLE and effective apparatus for testing field coils has been developed in the shops of the Virginia Electric & Power Company, Norfolk, Va. A transformer or "growler" was assembled for this purpose by the electric shop foreman. A table, measuring 30x30 in., was made of 2x2-in. angle iron and topped with a piece of 1½-in. hickory. The table back is of transite board on which is mounted a 30-amp. safety switch, a 50-amp. a.c. ammeter and knife switches for short circuiting the ammeter and selecting the different number of turns in the transformer winding. The core is made of No. 20 gauge sheet steel, the cross section being 4x5 in., while the inside of the rectangle measures 9½ in. vertically and 12 in. horizontally. The top horizontal member is hinged and counter-weighted so that it may be easily moved up and down providing free space for putting a field coil in place for test and at the same time making it easy to close the iron circuit during the testing. The front vertical leg is flush with the surface of the table. A removable piece represents the portion of the iron circuit between the short vertical leg and the moving horizontal member. The primary winding is wrapped around the portion of the iron under the table, No. 10 A.W.G. double cotton-covered wire being used. The winding has 180 turns, with taps at 60 and 90 turns leading to knife switches. The 90-turn winding is used for regular testing, the 60-turn winding for burning out a shorted turn quickly, and the 180-turn winding when repairing a shorted coil. Field coils are tested by placing them on the table and closing the iron circuit of the transformer. The safety switch is then closed, energizing the transformer. The knife switch connected across the ammeter is then opened. If the field coil is without shorted turns, the ammeter will indicate a current of exactly the same value as it does without a field coil on the transformer. If the field coil has any shorted turns, the current will be greater, the degree of short circuit being indicated by ammeter reading. It is for this reason a switch, short circuiting the ammeter, is used because a badly shorted coil will show an ammeter reading in excess of 50 amp. This apparatus has saved time and labor by the detection of defects at an early stage.

Assembly of field coil testing apparatus

◆

Redesigned Mate Floor Prevents Derailments*

By W. P. Davis

Roadmaster United Railways & Electric Company, Baltimore, Md.

AT TURNOUTS where the principal car movement is on a straight track and where floor bearing mates are used, a groove is soon worn in the floor on the straight side. This tends to cause derailments with car

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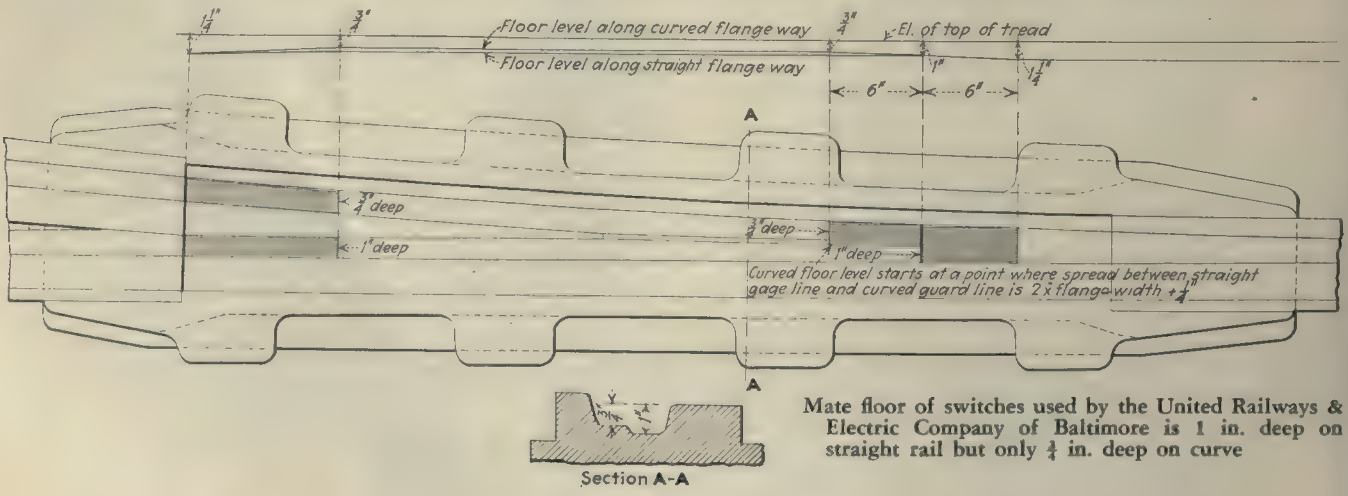
*Submitted in Electric Railway Journal *Prize Contest.*


1¼"
¾"
Floor level along curved flange way
¾"
El. of top of tread
Floor level along straight flange way
1"
1¼"
6"
6"
A
¾" deep
1" deep
¾" deep
1" deep
Curved floor level starts at a point where spread between straight gage line and curved guard line is 2 x flange width + ¼"
A
Section A-A

Mate floor of switches used by the United Railways & Electric Company of Baltimore is 1 in. deep on straight rail but only ¾ in. deep on curve

movements on the curve side. To avoid this trouble the United Railways & Electric Company of Baltimore has redesigned its switches so that the floor on the straight side is made 1 in. deep and the flanges do not touch, while on the curve side the floor is only ¾ in. deep. The approach to this higher floor is made at such a point that the car wheels will have already been guided into position by the switch tongue before the flanges touch the high floor. This design was adopted several years ago for wheel flanges 1¼ in. wide and 34 in. deep, and proved very satisfactory.

◆

Shunting Motors to Obtain Greater Speed

By R. S. Beers
Transportation Engineering Department
General Electric Company, Erie, Pa.

SUBSTANTIAL increase in the operating speed of existing street cars can sometimes be simply and cheaply accomplished by shunting the motors with non-inductive shunts. This has been tried successfully in several cities. It has been done on a considerable number of equipments by the Key System Transit Company and the United Railways & Electric Company of Baltimore. Where the operation includes considerable suburban running, with relatively infrequent stops, a material increase in schedule can be accomplished; the method is of little or no value, however, if the stops are close to each other.

The recommended practice is to accelerate the car on full field and, after all the resistance has been cut out of the circuit by the controller, to shunt the motors. As there is a considerable increase in current when changing from full field to shunt field, it is customary to have the motor current govern the change through the intermediary of a current relay. This method simplifies the control devices, so that they may be added readily to almost any existing control equipment.

The material used includes one ME-67 field shunting switch, weighing about 105 lb., one EW resistor, weighing about 35 lb., and cable and details. The ME-67 switch is used for either two or four-motor equipments, and includes the governing relay as an inherent part of the device. The EW resistor is used as a shunt for the motor field; all the shunts for either a two-motor or a four-motor equipment are included in the one EW resistor. With a Type K controller it is necessary to add a control finger, and with remote controls it is necessary to add an interlock to one or two of the contactors.

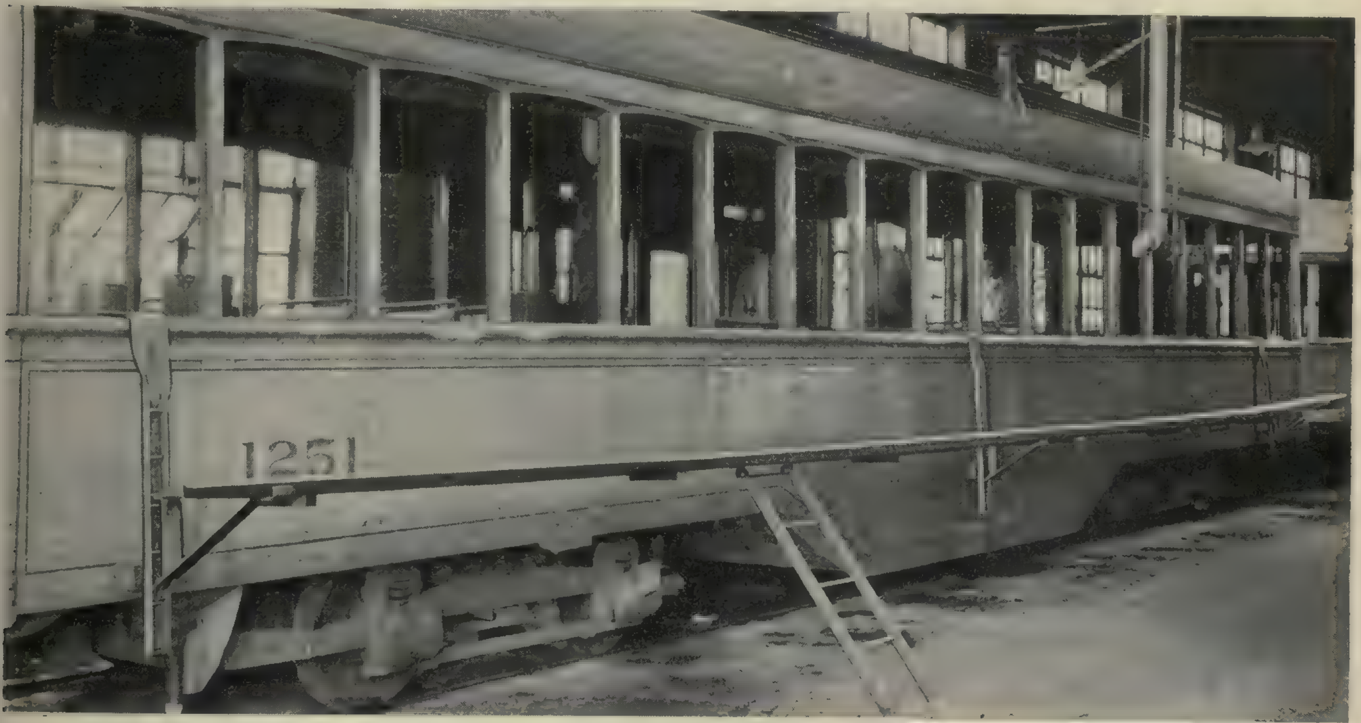
In general the method cannot be applied to advantage to non-commutating pole motors such as the GE-67, GE-80 and W-101. The conditions of operation, car weights, commutation of motors, etc., vary so much that no one can recommend field shunting with certainty of success in every instance. It is recommended that one equipment be installed and an actual test used to ascertain whether or not the method is successful.

◆

Adjustable Scaffold for Car Washing*

By R. C. Sohl
Engineer, Mechanical Department Cleveland Railway

HORSES and planking assembled to form a scaffold to reach the upper parts of the car, in the wash house of the Cleveland Railway, have been replaced by a set of brackets which hang from the window sills of the car. These brackets are constructed from 3-in. channel iron, bent to the shape of the window sill. They are adjustable by means of sets of horizontal rivets. The parts which rest on the window sill are covered with canvas and leather as a protection to the woodwork. This new equipment not only saves valuable space occupied by the horses formerly used, but also saves much of the



Brackets suspended from the windows support platform used in car washing or painting in the shops of the Cleveland Railway

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*Submitted in Electric Railway Journal *Prize Contest.*

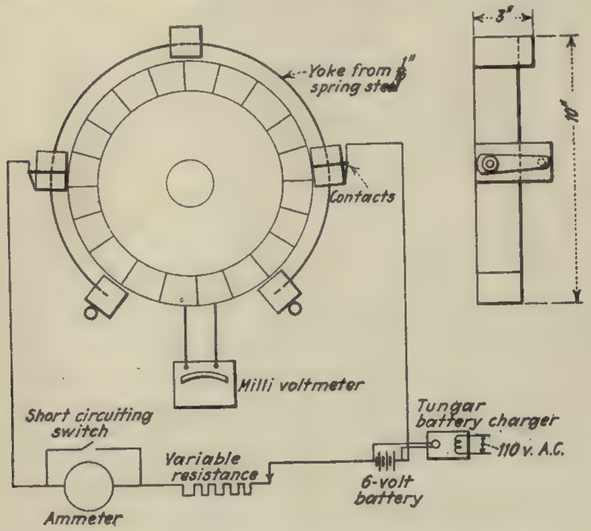
time required to set them up. Safety has been increased considerably. Whereas the old equipment rested on the floor and was unstable on a soapy concrete, the suspended scaffold eliminates the danger of slipping. The cost of a bracket is about $2.50. Four are necessary for one side of a 50-ft. car.

◆

Test for Partially Open Circuit*

By H. J. Beadle, E.E.
Dallas Railway & Terminal Company

READY detection of cracked or partially cracked coil leads has been attained by an additional test recently installed by the Dallas Railway & Terminal Company. A yoke which is made of $\frac{1}{16}$-in. spring steel is supported on five fiber blocks and will fit the commutator of any armature from 25 to 65 hp. This steel yoke is therefore insulated from the bars and supports the leads which carry the current to the commutator while testing. This current is supplied from a 6-volt storage battery and is varied by means of a rheostat. After a current of about 6 amp. has been attained, the ammeter can be short circuited and thus be protected during a time when a great many armatures are being tested. The tungar battery charger is connected to a 110-volt a.c. circuit and in this way the battery is kept in good condition at all times. It is important to keep the battery fully charged so as to insure a constant current while testing. The milli-voltmeter is used to get the voltage drop across each pair of bars and unless the voltages are between bars exactly alike there is something wrong with the armature. A higher reading than normal would indicate a partially open or broken lead and a lower reading would indicate a short between bars. This test is adaptable to modern high-speed motors with small wires where broken or cracked leads become more serious.



Circuit arrangement in making open circuit test

Belt Conveyor for Loading Concrete Mixer*

By E. B. Spenzer
Way Department Cleveland Railway, Cleveland, Ohio

TIME and labor are saved in loading material into the skip of a concrete mixer by using a belt conveyor loading device which has been developed by the Cleveland Railway. The method of loading by hand or wheelbarrow resulted in waste of time as the men crowded around the skip. Trucking proved equally costly, and frequently was impracticable when the mixer was placed in an inaccessible location.

With the belt conveyor connected to the mixer by a long draw bar, the material is shoveled on the conveyor from the side where it has been unloaded in a continuous pile from the work trains. One man stands at the skip and puts in the cement from the sacks. He also gages the amount of sand and gravel that the conveyor throws into the skip and when there is enough material for a batch, he blows a whistle as a signal for the men to stop shoveling on to the conveyor. These men stand at intervals along the conveyor for a distance of 30 ft. and have ample room in which to work. In the time required to mix a batch of concrete, the skip of the mixer is loaded. Thus no time is lost.

This conveyor is built on a low frame, 30 ft. long, mounted on two sets of small trucks. An endless belt runs horizontally along the car over two pulleys, one at each end. Guide pulleys are spaced at 3-ft. intervals and at a 45-deg. angle to tilt up the edges of the belt. Inside the edge of the belt and projecting lip are two side boards which prevent the material from going off the belt. Two steel aprons are on the side of the conveyor from which the material is loaded. These extend to within 1 ft. of the pavement and prevent the material from being thrown on to the surface track. The conveyor is operated by a small motor in the center of the car.

The number of men required for the complete job of mixing is reduced from 24 to 11, while the speed of mixing is increased by 20 per cent.

Belt conveyor used by Cleveland Railway for loading concrete mixer saves 53 per cent in labor

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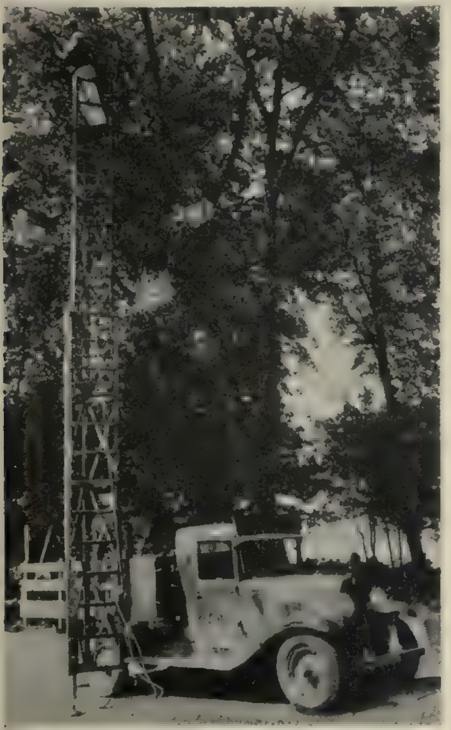
*Submitted in Electric Railway Journal Prize Contest.

NEW PRODUCTS for the Railways' Use

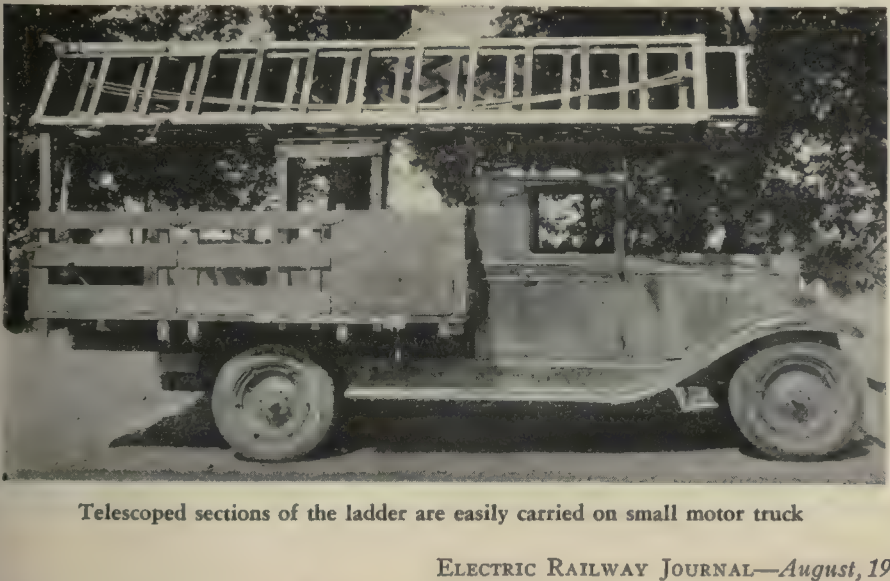


Light-weight convenient tower ladder developed for use on motor trucks

Triangular Tower Ladder

FOR light work of various kinds, a triangular tower ladder has been developed by J. R. McCardell & Company, Trenton, N. J. It has been designed for use with a small motor truck equipped with a steel supporting frame.

The ladder is placed erect at the side of the truck body, and is held firmly in position by the supporting frame and a resting leg attached to the outside post. The length of the resting leg can be adjusted to obtain a solid support. With an outside dimension of 26 in., the ladder weighs approximately 250 lb., and attains a height of 25 ft. from the ground to the platform. The outside section is equipped with 1½-in. steel rollers running in grooves of the inside section, which is raised and lowered by means of a block and fall with ½-in. rope. The ladder can be detached from the frame by removal of a pin.



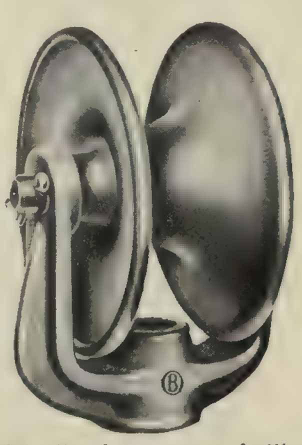
Telescoped sections of the ladder are easily carried on small motor truck

◆

Cable Roller for Stringing Feeder Wire

DAMAGE to feeder wire brought about by contact with crossarms during stringing is avoided by the use of a feeder cable roller, a new product of the Ohio Brass Company, Mansfield, Ohio. In this device attention has been paid particularly to ease of application and substantial construction. The yoke of the roller is provided with a hole tapered to correspond with the threaded portion of a standard insulator pin, over which it is slipped while in use. By this means, no special attachments are necessary. All parts are made of Flecto malleable iron, hot-dip galvanized, with the exception of the ¾-in. hardened-steel axle. The wheel has an over-all diameter of 6½ in.

In operation, the roller is placed on a pole crossarm pin and the wire is fed over it from one crossarm to another for as long a distance as may be desired. The wire is then lifted from the roller, which is removed from the pin, and the insulator installed. The rollers are then moved ahead on the job and the operation repeated. They are made to give long service, and accommodate all sizes and weights of feeder wire.



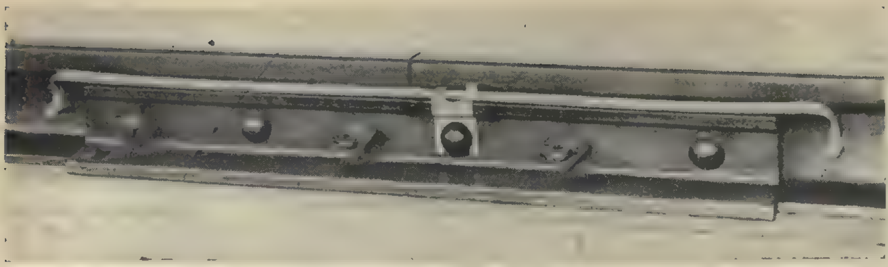
Cable roller for crossarm facilitates stringing feeder wire

◆

Combination Steel and Copper Rail Bond

OWING to the success obtained with strand steel bonds for automatic block signal circuits on the Pennsylvania Railroad, it was decided to determine if the signal bond, or a modification of it, would be adequate for the propulsion current for the 11,000-volt single-phase alternating current system used on that property. The American Steel & Wire Company made numerous experiments and finally developed a bond conductor which proved suitable.

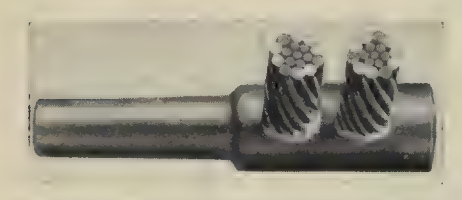
It was necessary to develop a bond which would carry safely 400 amp. at 25 cycles without undue heating. It was also necessary to develop a bond having a relatively low a.c.-d.c. resistance ratio. Experiments were conducted with so-called mixed strands having different arrangements of copper and steel wires. In carrying out this work, it was not only essential to satisfy the alternating



Rail bond especially designed for 11,000-volt single-phase a.c. railroad electrification

current impedance characteristics and current carrying capacity, but to develop a bond conductor which possessed the proper mechanical strength, and which was relatively inexpensive.

The bond, as finally developed, is quite simple and has two strands, each having ten copper and seven steel wires, arranged as shown in an accompanying illustration. Terminals are of soft steel and are tapered to make a drive fit into ⅜-in. holes in the rail web. The terminal is the same as for signal bonds which are very widely used throughout the country. The two strands are flash butt welded to the terminals simultaneously. This weld is very strong and the heat of welding is so localized that the strand is not affected thereby.

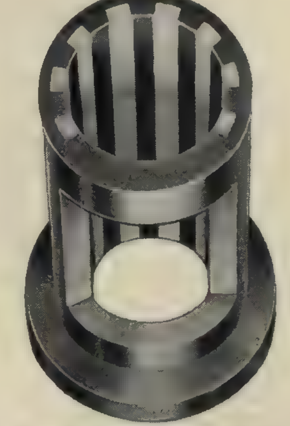


The bond consists of two strands each having ten copper and seven steel wires, arranged with seven copper wires in the center and three copper and all the steel wires on the outside

In order to give the bond an appearance of all steel, the steel wires are galvanized and the copper wires are tinned. The construction of the bond with two parallel conductors serves two purposes: the alternating current carrying capacity is increased over what it would be with a single conductor of cross-section twice the size; in case of failure from fatigue or outside mechanical injury, the likelihood of both strands breaking simultaneously is remote. As the bond is completely exposed for inspection, partial failures can be detected readily.

The bonds were put under laboratory test where it was found that 72 deg. C. rise in temperature resulted from a load of 400 amp. at 25 cycles. In the test piece terminal pins were driven into two pieces of rail.

Bimetallic Armature Bearing



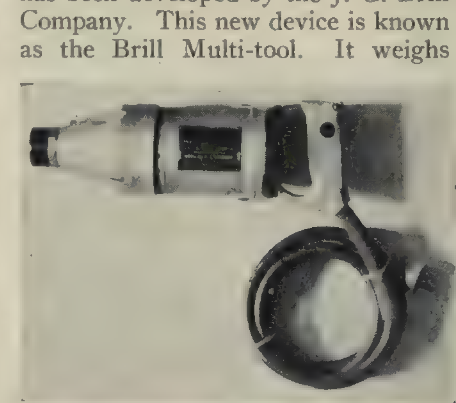
In this type bearing the contact surface is a combination of bronze and lead base babbitt strips

REDUCTION in the amount of babbitt metal required is an advantage claimed for a new bimetallic armature bearing developed by the National Bearing Metals Corporation. In this bearing, eight slots have been cut in the bronze parallel to the axis of the armature shaft, thus giving a combination contact of bronze and lead base babbitt metal. During tests of these bearings, 160,000 miles of service was obtained without serious wear on the bearing.

◆

Portable Electric Hand Tool

A SINGLE power unit arranged to drive a variety of hand tools has been developed by the J. G. Brill Company. This new device is known as the Brill Multi-tool. It weighs only 5¼ lb., and particularly lends itself to convenient storage of attachments. It is specially adapted to the transportation field. More than fifteen major operations and almost unlimited minor functions can be accomplished by the use of this one power unit. These include drilling, grinding, buffing, sanding, sawing, nut setting, screw driving, planing, filing, valve grinding, reaming, under cutting, nibbling, shearing and mixing.



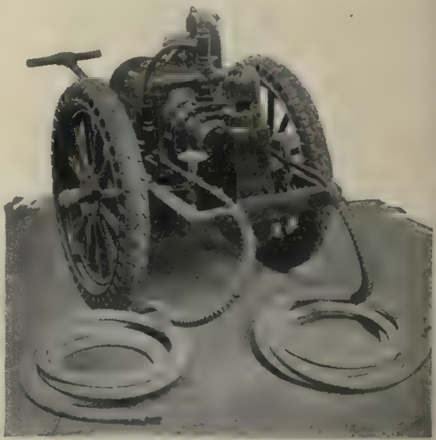
Electric tool adaptable for many uses weighs only 5¼ lb.

In the automotive field this tool, in addition to valve grinding and carbon removing, can also be used for body cleaning and polishing, tire and battery repairing, and metal polishing.

◆

Rail Preheater Made More Compact

GREATER compactness, lightness and suitability for joint maintenance are features of a rail preheater developed by the Metal & Thermit Corporation. Either kerosene or gasoline is used as fuel. This is mixed with air from a positive pressure blower driven directly by a motor. Its air intake is through a rotating air filter or strainer located high enough above the ground to avoid the dust and grit always found around construction work. The fuel tank is of ample capacity and is underslung beneath the chassis which is mounted on Ford cushion-tire wheels.



Compact preheater for making Thermit joints

This machine is built in two models. One uses a 550-volt d.c. motor. The other is driven by a 220-volt d.c. motor connected in series with standard space heaters which thoroughly warm the incoming air. It is stated that this gives more economical operation, as it is easier to maintain the fuel in suspension in the preheated air.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
June, 1930..........	743,277	646,615a	....	96,662	42,297
June, 1929..........	779,474	658,763a	....	120,711	61,314
12 Mo. end June, 1930	9,508,732	7,976,986a	....	1,531,746	848,573
12 mo. end. June, 1929	9,585,384	8,205,288a	....	1,380,096	749,242
Northwestern Pacific R.R., San Francisco, Cal.					
May, 1930..........	485,027	446,844	35,854	2,243	*2,800d*
May, 1929..........	534,895	423,138	38,237	73,438	73,597d
5 mo. end. May, 1930	2,065,839	2,175,458	180,856	*290,704*	*313,042d*
5 mo. end. May, 1929	2,188,737	2,196,811	191,182	*199,385*	*208,873d*
Capital Traction Company, Washington, D. C.					
June, 1930..........	340,623	245,606	26,155	74,103	40,884
June, 1929..........	359,494	255,072	27,406	82,420	49,097
6 mo. end. June, 1930	2,125,179	1,520,047	165,434	452,200	269,091
6 mo. end. June, 1929	2,201,290	1,529,901	173,578	512,768	330,298
Jacksonville Traction Co., Jacksonville, Fla.					
May, 1930..........	89,731	71,286	8,820	9,061	....
May, 1929..........	98,918	77,774	9,215	11,349	....
12 mo. end. May, 1930	1,106,580	903,838	106,919	89,432	*66,663*
12 mo. end. May, 1929	1,177,796	951,547	106,664	113,242	*47,682*
Honolulu Rapid Transit Co., Honolulu, T. H.					
May, 1930..........	88,437	50,810	8,819	31,008	19,704
May, 1929..........	88,382	51,892	7,932	29,569	18,346
5 mo. end. May, 1930	432,827	257,161	44,096	138,095	78,392
5 mo. end. May, 1929	442,981	255,608	50,395	142,578	86,461
Chicago Surface Lines, Chicago, Ill.					
June, 1930..........	4,766,687	3,835,838a	....	930,848	776,880g
June, 1929..........	5,118,795	4,015,900a	....	1,102,899	848,376g
Louisville Railway, Louisville, Ky.					
4 mo. end. Apr., 1930	1,770,201	1,318,286a	....	451,915	....
12 mo. end. Dec., 1929	5,263,949	4,111,045a	....	1,152,904	....
United Railways & Electric Co., Baltimore, Md.					
June, 1930..........	1,332,275	916,851	126,157	301,565	35,318e
June, 1929..........	1,368,136	941,037	133,435	313,638	33,710e
6 mo. end. June, 1930	8,495,733	5,791,821	832,822	1,939,299	299,082e
6 mo. end. June, 1929	8,390,353	5,766,486	819,136	1,893,889	195,687e
Department of Street Railways, Detroit, Mich.					
June, 1930..........	1,787,953	1,446,482	65,090	285,834	159,027
June, 1929..........	2,193,665	1,704,344	62,422	437,112	296,727
12 mo. end. June, 1930	24,338,810	19,473,857	766,462	4,227,336	2,503,598
12 mo. end. June, 1929	26,329,072	20,888,667	754,745	7,872,689	3,130,286
Eastern Massachusetts Street Railway, Boston, Mass.					
June, 1930..........	619,456	408,468	26,824	194,018	28,672
June, 1929..........	685,474	434,576	30,658	241,556	69,138
6 mo. end. June, 1930	4,089,923	2,565,349	181,441	1,402,961	345,916
6 mo. end. June, 1929	4,437,488	2,700,240	199,581	1,648,727	537,689
Twin City Rapid Transit Co., Minneapolis, Minn.					
3 mo. end. June, 1930	3,019,470	2,226,077	....	793,392f	211,426
3 mo. end. June, 1929	3,249,703	2,420,057	....	829,645f	223,887
6 mo. end. June, 1930	6,598,966	4,766,007	....	1,832,958f	645,037
6 mo. end. June. 1929	7,013,530	5,086,337	....	1,927,192f	686,923
Kansas City Public Service Company, Kansas City, Mo.					
June, 1930..........	656,292	562,398a	....	93,393	6,396h
June, 1929..........	713,507	587,000a	....	126,506	41,959h
6 mo. end. June, 1930	4,279,230	3,577,378a	....	701,852	234,288h
6 mo. end. June, 1929	4,518,265	3,637,842a	....	880,423	405,261h
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
May, 1930..........	79,126	60,712	4,800	17,953	*13,182*
May, 1929..........	84,881	57,674	7,840	23,075	*9,974*
5 mo. end. May, 1930	411,851	317,177	24,000	96,157	*59,443*
5 mo. end. May, 1929	430,636	308,612	39,200	95,531	*64,263*
Brooklyn-Manhattan Transit Corporation, New York, N. Y.					
June, 1930..........	5,070,028	3,231,745	359,998	1,543,947	776,675
June, 1929..........	4,168,000	2,741,014	213,037	1,346,674	603,523
12 mo. end. June, 1930	60,700,981	39,786,537	4,001,506	17,774,285	8,494,218
12 mo. end. June, 1929	48,586,548	31,256,534	3,304,037	15,073,622	6,518,373
Brooklyn & Queens Transit Corporation, New York, N. Y.					
June, 1930..........	1,968,238	1,478,334	125,622	381,037	257,482
June, 1929..........	2,059,234	1,661,608	82,283	343,224	216,693
12 mo. end. June, 1930	23,589,180	18,386,370	1,389,324	4,065,018	2,563,546
12 mo. end. June, 1929	24,142,066	19,851,748	1,261,034	3,296,208	1,759,252
Hudson & Manhattan R.R., New York, N. Y.					
June, 1930..........	989,627	499,396a	....	490,231	154,985
June, 1929..........	1,006,646	508,250a	....	498,396	162,264
6 mo. end. June, 1930	6,252,254	3,105,535a	....	3,146,718	1,137,836
6 mo. end. June, 1929	6,286,632	3,161,901a	....	3,124,730	1,108,429
Interborough Rapid Transit Company, New York, N. Y.					
June, 1930..........	5,832,071	3,815,405	212,325	1,804,339	*218,727j*
June, 1929..........	5,725,994	3,452,601	189,726	2,083,666	*48,761*
12 mo. end. June, 1930	72,747,907	45,401,437	2,522,435	24,824,034	*2,155,077j*
12 mo. end. June, 1929	69,735,730	42,344,462	2,393,735	24,997,532	3,007,900
Long Island Railroad, New York, N. Y.					
May, 1930..........	3,346,650	2,256,980	285,483	802,990	632,246d
May, 1929..........	3,569,669	2,358,440	265,585	947,471	772,092d
5 mo. end. May, 1930	15,124,693	11,361,755	814,088	2,944,584	2,202,931d
5 mo. end. May, 1929	15,506,699	11,300,190	752,473	3,443,398	2,701,924d
New York Railways, New York, N. Y.					
May, 1930..........	486,467	422,715a	....	63,752	*8,003b*
May, 1929..........	541,163	451,918a	....	89,245	27,911b
12 mo. end. May, 1930	2,269,863	2,038,271a	....	231,592	*132,187b*
12 mo. end. May, 1929	2,534,352	2,215,574a	....	318,778	*34,576b*
Staten Island Rapid Transit Co., New York, N. Y.					
May, 1930..........	214,848	159,605	17,000	38,243	25,183d
May, 1929..........	270,744	178,863	17,000	74,881	37,025d
5 mo. end. May, 1930	976,943	758,986	86,500	129,885	95,938d
5 mo. end. May, 1929	1,178,115	864,257	89,000	224,847	40,262d
Third Avenue Railway System, New York, N. Y.					
June, 1930..........	1,483,592	1,221,475a	....	262,117	45,078
June, 1929..........	1,527,603	1,311,997a	....	205,606	*4,714*
12 mo. end. June, 1930	17,618,574	14,088,315	1,155,437	2,374,821	*199,460*
12 mo. end. June, 1929	17,880,641	14,453,412	1,154,847	2,272,382	*286,333*
New York State Railways, Rochester, N. Y.					
3 mo. end. Mar. 1930	2,229,579	1,983,406a	....	276,963	*95,673*
3 mo. end. Mar. 1929	2,556,175	1,920,934a	....	577,266	200,611
Philadelphia Rapid Transit Company, Philadelphia, Pa.					
3 mo. end. June, 1930	13,423,866	9,946,908a	....	3,711,646	*58,864*
3 mo. end. June, 1929	14,255,944	10,748,208a	....	3,836,208	10,576
6 mo. end. June, 1930	27,254,524	20,520,045a	....	7,170,926	*157,981*
6 mo. end. June, 1929	28,441,136	21,546,476a	....	7,536,182	*109,792*
Galveston-Houston Electric Ry., Houston, Tex.					
May, 1930..........	41,686	25,342	2,603	13,740	....
May, 1929..........	49,181	29,271	2,565	17,343	....
12 mo. end. May, 1930	552,309	315,903	32,595	204,003	*65,653*
12 mo. end. May, 1929	617,174	347,172	31,665	238,336	*32,508*
Houston Electric Company, Houston, Tex.					
May, 1930..........	262,653	171,687	23,281	67,684	....
May, 1929..........	287,354	173,236	25,530	88,588	....
12 mo. end. May, 1930	3,292,401	2,063,386	262,562	985,458	597,837
12 mo. end. May, 1929	3,383,455	2,086,639	287,781	1,009,033	600,635
Pacific Northwest Traction Co., Seattle, Wash.					
May, 1930..........	79,715	56,384	4,015	19,314	....
May, 1929..........	76,362	60,866	4,157	11,338	....
12 mo. end. May, 1930	994,661	703,935	55,176	235,548	120,728
12 mo. end. May, 1929	889,408	749,670	53,215	86,521	*37,909*
Calgary Municipal Railway, Calgary, Alta.					
5 mo. end. May, 1930	425,934	282,585	....	....	11,696
5 mo. end. May, 1929	....	....	....	....	35,971
Lethbridge Municipal Railway, Lethbridge, Alta.					
4 mo. end. Apr., 1930	18,872	15,546	....	3,326	*7,016*
4 mo. end. Apr., 1929	....	....	....	....	*5,279*
British Columbia Electric Railway, Vancouver, B. C.					
April, 1930..........	1,213,993	892,823a	....	321,170	....
April, 1929..........	1,205,482	816,975a	....	388,507	....
10 mo. end. Apr., 1930	12,324,706	8,640,255a	....	3,684,451	....
10 mo. end. Apr., 1929	14,748,835	10,804,611a	....	3,944,224	....
British Columbia Electric Railway, Vancouver, B. C.					
May, 1930..........	1,233,292	748,287	....	485,005	....
May, 1929..........	1,165,279	653,037	....	512,242	....
11 mo. end. May, 1930	13,558,000	7,922,053	....	5,635,947	....
11 mo. end. May, 1929	12,914,845	7,050,820	....	5,864,025	....
Guelph Radial Railway, Guelph, Ont.					
6 mo. end. Apr., 1930	47,641	42,449	514	4,678	*13,655*
6 mo. end. Apr., 1929	....	....	....	....	*12,337*
Ontario Hydro-Electric Railways, Essex District, Windsor, Ont.					
6 mo. end. Apr., 1930	567,633	469,070	2,828	95,734	*88,971*
6 mo. end. Apr., 1929	....	....	....	....	56,562
Regina Municipal Railway, Regina, Sask.					
5 mo. end. May, 1930	190,552	125,454	....	....	*12,015*
5 mo. end. May, 1929	....	....	....	....	18,528
Saskatoon Municipal Railway, Saskatoon, Sask.					
5 mo. end. May, 1930	179,663	118,739	7,057	....	*3,979*
5 mo. end. May, 1929	....	....	....	....	17,802
Mexico Tramways, Mexico City, Mex. c					
May, 1930..........	859,600	927,280a	....	*67,680*	....
May, 1929..........	928,094	926,561a	....	1,533	....
5 mo. end. May, 1930	4,184,210	4,445,620a	....	*261,410*	....
5 mo. end. May, 1929	4,568,033	4,437,343a	....	130,690	....

a Includes taxes. b Before adjustment bond interest. c In Mexican currency. d Net after rents. e After interest on income bonds. f Before taxes. g After city's 55 per cent. h Before depreciation. j Amount by which the full 5 per cent rental on Manhattan Railway guaranteed stock was not earned.

NEWS *of the Industry*

LATE NEWS

East St. Louis, Ill. — The Illinois Commerce Commission on July 23 took under advisement the application of the East St. Louis Railway for a straight 10-cent fare instead of 10 cents for single fares and five tokens for 40 cents. Prior to the conclusion of taking the evidence, the commission overruled a motion by counsel for the city for a reappraisal of the company's properties.

✦

Phoenix, Ariz.—At a meeting of the Council on July 14, it was decided to increase the fare on the municipal railway from 5 cents to 7 cents cash with four tokens for 25 cents for adults. School fares will be twenty for $1.

✦

San Diego, Cal.—At a recent meeting of delegates of the League of California Municipalities, a committee of the members was appointed, at the suggestion of Commissioner W. J. Carr of the California Railroad Commission, to develop a plan for assisting the cities, and supporting the railroad commission in the work of regulating the public utilities of the state.

✦

Jamestown, N. Y. — The Celoron Amusement Company, owned by the Jamestown Street Railway, which has operated an amusement park 5 miles from here on Lake Chautauqua, has been sold for $400,000, to Thomas and George Carr, managers of the park for the past ten years. The park was established 25 years ago by the late A. N. Broadhead, head of the railway, to promote business on its Celoron-Jamestown line.

✦

Los Angeles, Cal.—Five more single-deck, 29-passenger coaches are being delivered to the Los Angeles Railway to be added to the 2,300 series. These coaches are generally similar to the other rear-door equipment recently delivered, but are the first single-deckers to have single-sash drop plate glass windows.

✦

Rochester, N. Y.—In an endeavor to remedy abuses of the transfer privilege, the New York State Railways, Rochester lines, has put into use a new transfer to be issued to passengers only on request and at the time of paying fare, expect in emergency cases where cars are turned back. In such cases special emergency transfers will be issued.

✦

Quebec, Que. — As the result of an order from the railway commissioners, the Quebec Power Company is authorized to extend its street car service in St. François d'Assise and Charlesbourg, as far as the city limits. At present the track runs only as far as the new Canadian National Railway tunnel, but the extension is expected to be completed and in operation by the start of next winter.

(Late News Continued on Page 542)

Terminable Permit Suggested at St. Louis

Transportation Survey Committee Recommends Co-ordination With Liberal Subway Construction Program. Need for New Street Cars Stressed

THE Transportation Survey Commission of St. Louis, Mo., made its final report to the Board of Aldermen on July 25. Among other things it suggested that the St. Louis Public Service Company be granted a terminable permit for 50 years, thus giving the city the largest measure of home rule in the regulation of its railway and bus rates obtainable under the present city charter.

In its report the commission also favored co-ordination of cars and buses, ultimate elimination of parking downtown and in other congested districts, restrictions on service car operations, construction of a subway under Olive Street between Third and Nineteenth Streets to cost about $10,000,000, the rerouting of various railway lines, construction of traffic signals and safety zones at various points, completion of the street widening program prepared by the City Plan Commission and the elimination of 530 little-used street car stops on various lines.

The report recommends the adoption of the comprehensive plan of subway construction suggested by the Kinsey Commission in 1926, such construction to be undertaken when the city's growth demands these improvements. The subways suggested by the Kinsey Commission would cost approximately $240,000,000.

In his report on rapid transit R. F. Kelker, Jr., who was consulting engineer for the Transportation Survey Commission, contended that St. Louis is not ready for subways and that the existing surface street car lines can be developed to meet the city's transportation needs for years to come.

Stressing the necessity of new street cars, bus service extensions, rerouting of car lines and additional power facilities, the commission suggests that the Aldermen move to make it possible for the company to borrow $23,760,000 to carry through a five-year program of expenditures for new cars and betterments.

Two alternative plans of new permits for the railway are suggested:

1. A terminable permit for 50 years and providing home rule by securing necessary enabling legislation at the next session of the Missouri General Assemby to create a St. Louis Transit Commission having full power over local utilities, now vested in the Missouri Public Service Commission.
2. A contract with the railway in which it would agree to unify all mass transportation, and the city agree to acquire ownership of the properties through a share in the receipts from operation. In this connection the commission recommends that when the city obtains ownership of the transportation system it arrange for a lease for private operation.

Walter J. G. Neun, president of the Board of Aldermen, and Edward L. Kuhs, Aldermen from the First Ward, members of the commission, dissented from the recommendation for a terminable permit.

The Business Outlook

EXACTLY a year after business scaled the peak of its 1929 boom it is reaching its low in the subsequent depression. As we move further into the last half the paralyzing pessimism of recent months will find less to feed on in the comparative records of this year and last. While general trade is beginning to sag under the pressure of months of impaired confidence, industrial activity and railroad movement show signs of revival under the stimulus of depleted stocks, and non-agricultural commodity prices are strengthening. At this crucial point, emergency Farm Board support of farm prices against the weight of temporary crop surpluses, and further Federal Reserve support of the bond market are vitally necessary. This is the decisive round in the contest with the forces of deflation.—*The Business Week.*

Start Made on Chicago Subway Plans

Plans for Chicago's subway progressed apace when the first meeting of all concerned on actual subway construction since the approval of the transportation ordinance was held on July 23 in the office of Walter L. Fisher, attorney for the local transportation committee of the Council. The removal of pipes, wires, conduits, vaults and other property of the public utilities in State Street preparatory to digging the subway was discussed, but no decisions were made.

Engineers state that their plans have progressed to a point where it will soon be necessary to know what utilities wish to use the galleries to be provided for them in the subways, and which positions they prefer.

The "L" has filed condemnation proceedings against the property of 203 Chicago owners. It hopes in this way to procure the remaining property necessary for the widening of its Garfield Park branch between Marshfield and Laramie Avenues. Much of the necessary property has already been obtained by private purchase. This proposed improvement will be the first started under the terms of the recent franchise grant.

Electrification Prospects at Chicago

Definite action in Chicago's efforts to have its railroad terminals electrified is gradually approaching. The chairman of the City Council railway terminals committee, said recently:

"This committee has not yet given up hope of obtaining agreement of the railroads to a unified terminal and electrification of lines within the city. We are holding meetings weekly and are hopeful of results. However, if the railroads refuse to co-operate, the city will file a certificate of public convenience and necessity before the Commerce Commission citing the public need for electrification.

"So far the railroads have continued to declare that their revenues have decreased to such an extent that they are unable to electrify. They have stated that they have no prospect of much improvement within the next 25 years because of the increasing competition in passenger service from the automobile and airplane."

◆

Rochester-Buffalo Coach Order Modified

The Public Service Commission has amended its order granting the Rochester, Niagara Falls & Buffalo Coach Lines, Inc., permission to operate a bus line between Rochester and Buffalo, by way of Lockport, N. Y. The modified order permits operation of buses only from Rochester to Lockport, where transfer must be made to the International Railway to Buffalo.

The coach company may renew its petition for a bus line through to Buffalo at the end of a six-months' period. It was planned to supplant the present Rochester, Lockport & Buffalo electric interurban line with buses. The officers of the coach company are the same as those of the electric railway.

◆

Segregation Planned at Portland, Ore.

To facilitate compliance with a recent order of the Oregon Public Service Commission that the power and the railway businesses of the Pacific Northwest Public Service Company, Portland, be kept entirely separate, the company proposes to form two subsidiaries for administrative purposes. Under the plan proposed, the Portland General Electric Company will be formed to take over the physical property and franchises covering the power and light and interurban railway operations, and the Portland Traction Company to take the local railway property and franchises. The formation of the new companies has no interest at the present time for investors since the parent Pacific Northwest Public Service Company will become the sole owner.

◆

747 Graduates of Chicago First Aid Classes

The Britton I. Budd Medal for the Saving of Human Life was awarded to two employees of the Chicago Rapid Transit Company, one employee of the Chicago, North Shore & Milwaukee Railroad, and one employee of the Chicago, Aurora & Elgin Railroad recently at the eighth annual first aid and safety banquet of the associated electric railway and motor coach lines serving the Chicago metropolitan area. Presentations of the medals were made by Mr. Budd, president of the companies, who instituted the award in 1926 as a fitting recognition for any employee who succeeds in saving the life of anybody, anywhere and at any time. These awards made a total of 21 employees of the various transportation lines who have saved human lives as a result of first aid training under the direction of the medical department, headed by Dr. Hart E. Fisher, chief surgeon. The banquet marked new records in first aid training of employees in these transportation companies, with a total of 747 receiving diplomas as compared with 558 last year.

◆

Many Interesting Bus Topics on Pittsburgh Program

More than 1,000 traffic men and engineers, motor truck and motor coach operators are expected to attend the annual National Transportation Meeting of the Society of Automotive Engineers to be held in Pittsburgh, Oct. 22, 23 and 24. The Pittsburgh Section, under the direction of Chairman J. M. Orr, is making arrangements for the dinner and will conduct the affair. For the technical sessions the following speakers and topics have been selected and scheduled:

C. W. Stocks, editor of *Bus Transportation,* "Requirements for Performance-Indicating and Recording Devices, Their Installation and Operation."

H. B. Hewitt, of the Philadelphia Rural Transit Company, "Scientific Inspection of Motor-Vehicles and Their Units."

P. V. C. See, of the Northern Ohio Light & Power Company, "Motor-Vehicle Maintenance Methods to Prevent Delays."

Austin M. Wolf, consulting automotive engineer, "Practical Mathematics for Determining Tractive Ability."

Adrian Hughes, Jr., of the United Railways & Electric Company, Baltimore, "How Advantage Can Be Taken of the Latent Heat of Cooling Water."

James W. Trimmer, of the Carnegie Institute of Technology, "How the Principles of Economics in Motor-Vehicle Transportation Are Taught by Educational Institutions."

The paper by Professor Trimmer will be supplemented by prepared discussion by J. S. Lowe, of the Northern Ohio Light & Power Company, describing the school of training established by that company for its motor coach operators. Frank D. Coll, of the Aluminum Company of America, will present a paper describing the use of aluminum alloys in commercial motor-vehicles.

◆

Canadians Announce Program for Ottawa Meeting

The tentative program has been announced for the papers and timely topics to be presented at the 26th annual convention of the Canadian Electric Railway Association at Ottawa on Sept. 18, 19 and 20. The program follows:

Wednesday, Sept. 17, 1930

Timely Topics — "The Effect of Traffic Lights on Street Car Operation," by D. E. Blair, general superintendent Montreal Tramways, and W. F. Irvin, traffic study engineer Toronto Transportation Commission.

Thursday, Sept. 18, 1930

Paper — "The Trolley Bus," by E. A. West, general manager Utah Light & Traction Company.

Discussion led by Fred E. Dayes, chief engineer A.C.F. Motors Company, and Ross Schram, vice-president Twin Coach Corporation.

Timely Topics—"Fire Protection—Methods Used to Reduce Fire Hazards and Decrease Insurance Premiums," by J. C. L. Ryan, engineer and rating expert Johnson & Higgins, Ltd., Montreal, P. Q., and W. E. P. Duncan, engineer of structures Toronto Transportation Commission.

"Operating Features of Cars Recently Purchased by Canadian Electric Railways," by A. M. Lindsay, superintendent of rolling stock Montreal Tramways, and representative of British Columbia Electric Railway.

Friday, Sept. 19, 1930

Paper—"Street Railway Fares," by Prof. Albert S. Richey.

Discussion led by J. B. Hayes, manager Nova Scotia Light & Power Company, Ltd.

Timely Topics—"Welding as Applied to Track Maintenance," by W. A. MacRae, engineer of way Toronto Transportation Commission, and J. G. McCarty, manager Metal & Thermit Corporation, Toronto.

"Bus Inspection Methods," by H. R. Holder, superintendent of autobus department Montreal Tramways, and M. D. Mills, experimental engineer Motor Coach Division General Motors Truck Company.

Trouble Shooters of the Rochester Railway and Bus Lines Being Dispatched by President Tilton

LATE NEWS

(Continued from Page 540)

Washington, D. C.—One-man street cars will be installed on the Mount Vernon, Alexandria & Washington Railway on Aug. 15 if the Public Utilities Commission grants the plea of the railway asking permission for the change.

◆

New York, N. Y.—Representatives of the Board of Transportation are engaged in the work of getting written consent of property owners on the proposed subway route along Worth Street, East Broadway and Grand Street, from Church Street to Lewis Street, a project approved by the Board of Estimate recently.

◆

Chicago, Ill. — The receivers for the Chicago Railways were ordered by the United States District Court of Northern Illinois to pay regular semi-annual interest and 5 per cent on principal amount of the first mortgage bonds of the company on Aug. 1, 1930. Last year 10 per cent of the principal amount of these bonds was paid by order of the court and interest has been regularly paid since the bonds defaulted in principal in 1927.

◆

Pittsburgh, Pa. — Trainmen of the Pittsburgh Railways have defeated a proposal that they work on a six-day instead of seven-day schedule to save the jobs of 300 now on the "extra list" or soon to be there.

◆

Fort Wayne, Ind. — Arrangements have been made for the hearing of evidence on the petition of the Indiana Service Corporation for authority to increase the price of a single cash fare from 7 cents to 10 cents and the price of four tokens from 25 cents to 30 cents. The company will continue to sell its weekly pass for $1. The corporation announced about a year ago, when it granted an increase in wages, that it would ask an increase in fares. Its officials maintain that its rate of return has fallen off since 1926 and that it cannot maintain efficient service and extend its service without the petitioned increase.

◆

Holyoke, Mass.—Early installation of the one-man system of operation by the Holyoke Street Railway is forecast. Directors have agreed to authorize the manager to put the plan in force at such time as he deemed necessary.

◆

Atlanta, Ga.—The Georgia Supreme Court has upheld the right of the State Public Service Commission to regulate motor carriers. In a decision rendered on July 26, the state's highest tribunal declared the Fulton Superior Court in error in granting an injunction to the Saye M. Davis Transfer Company to prevent regulation. The Supreme Court held that the motor carrier act of Georgia was not unconstitutional, as declared by the petitioner, and that it was unnecessary to determine whether a carrier was a private or common servant.

◆

Grays Harbor, Wash.—More than 5,000 youngsters and parents of Grays Harbor County consumed 750 gal. of ice cream and 23,000 cones at the Fourth Annual Kids Party held at Electric Park, Aberdeen, Wash., by the Grays Harbor Railway & Light Company in July. The announcement of this year's party was one of the first official acts of J. R. Snider, newly elected general manager of the company, to allay the juvenile fears that the party might be discontinued because of the death of its founder, Wallace W. Briggs. A feature of the party was the dedication of an ornamental fountain carrying the following inscription: "Wally Briggs Swimming Hole, built for the boys and girls of Grays Harbor, and dedicated to their happiness by Wallace Wheaton Briggs, general manager, 1929."

◆

Baltimore, Md.—William McCallister, president of the Hamilton Improvement Association, has suggested to the United Railways & Electric Company a bus line to connect the Harford and Belair roads, providing a more direct route from that section of the city to the southeastern section. It is urged that the route follow the new Echodale Boulevard, which is to be built.

◆

Staunton, Va.—The City Council has directed City Manager Day to transmit to officials of the Shenandoah Traction Company at Pittsburgh an approved draft of a franchise for operation of a bus service here in place of the existing railway. As the draft has the approval of the city attorney and attorneys for the new company, the action is regarded as practically the final step in agreement on a bus franchise. The final franchise draft provides for a fare not more than 10 cents, subject to revision within five years to "not less than 5 cents." The grant is to run for 15 years.

◆

Rochester, N. Y.—An order for discontinuance of the Rochester & Eastern Railway, was signed on July 26 by Judge Simon L. Adler in Federal court, on the application of receivers for the New York State Railways. It was made effective at midnight July 31. Seven communities on the route will be left without transportion. Other parts of the line are being served by a bus line with headquarters in Syracuse.

◆

High Point, N. C.—Members of the City Council will submit a plan to officials of the North Carolina Public Service Company calling for the operation of buses here instead of street cars, and giving the company the right to remove all trackage that is not needed by the High Point, Thomasville & Denton Railroad for car shifting purposes.

They Saw It in the News

A 17-LINE ride-selling item in ELECTRIC RAILWAY JOURNAL NEWS for May 31 has provoked inquiries to the company mentioned from Pittsburgh, Binghamton, Los Angeles, Des Moines, Seattle, Tacoma and other cities for further details. This is typical. If you are not reading ELECTRIC RAILWAY JOURNAL NEWS, you are missing a service designed especially to keep you well-informed on current events. And current events are the materials that make history!

Cleveland, Ohio.—The charge that the Cleveland Interurban Railroad, which operates the Van Sweringens' Shaker Heights rapid transit line, violated the Ohio utilities regulations when it increased the fare from 10 to 15 cents has been made in a petition filed with the Ohio Utilities Commission.

◆

Washington, D. C. — Revaluation of the local railways based on a physical inventory of their used and useful property has been asked of the Public Utilities Commission by Richmond B. Keech, people's counsel. The revaluation is asked to establish a new basis for fixing rates, in an effort to bring about a reduction in the 10-cent cash fare, with four tokens for 30 cents, recently granted by Justice Jennings Bailey, of the District Supreme Court. Mr. Keech contends that radical changes have taken place in prices and equipment since the physical inventory of 1914.

◆

St. Augustine, Fla.—Service by bus has been substituted for the trolley line to St. Augustine Beach run by the Florida Power & Light Company.

◆

Richmond, Cal.—The Key System Transit Company has applied to the California Railroad Commission for an order permitting the operation of a bus line here in accordance with a permit granted by the City Council.

◆

St. Louis, Mo.—Counsel for the St. Louis Public Service Company on July 28 asked the Public Service Commission to dismiss the protests against the rerouting of cars on the Fourth Tower Grove, Compton and Bellefontaine lines. The company points out that it cannot furnish a "door-to-door service to its patrons," and that the line was rerouted in the interest of the general good of patrons and of economy in operation.

◆

Chicago, Ill.—Federal Judge Wilkerson entered a decree on July 23 fixing the amount and priority of liens against the Chicago City Railway and the Calumet & South Chicago Railway. Receivership proceedings have been continued until Sept. 25, after which date an order of sale will probably be entered.

◆

Jamestown, N. Y.—Work of removing the tracks of the Warren & Jamestown Street Railway in this city is under way. The company abandoned service between Warren, Pa., and Jamestown, N. Y., Dec. 1, 1929, and the removal of tracks marks the termination of the line.

◆

Venice, Ill.—Preliminary steps have been taken toward the construction of an 800-ft. reinforced concrete viaduct to carry Broadway here, over the tracks of the Terminal Railroad Association and other railroads. The estimated cost of the project is $500,000. The Terminal Railroad Association of St. Louis, the Illinois Terminal Railroad and the city of Venice would share the cost.

◆

Raymond, Wash.—The Willapa Electric Company has replaced operation of its railway system in the South Bend-Raymond district with buses. Workmen are removing the tracks through Raymond to speed up paving of the state highway which is to form an important link in the Ocean Beach route.

Amicable Settlement of Niagara Falls Case Arranged

The Public Service Commission on July 29 approved the operation of buses by the International Railway on Hyde Park Boulevard and other streets in Niagara Falls to supplement its trolley service. The line will be established only if the International Railway's petition for an 8-cent fare is granted.

The order of the commission approves a franchise granted to the International Railway by the City of Niagara Falls for the operation of buses over streets extending northward through a comparatively new section of the city and looping at the southeast through an older part of the city. The new line is about 4 miles long.

The proposed bus line is to provide needed additional service for employees of industrial plants at the northern end of the route and at the loop over which the buses are to be turned at the southern end of the route. Buses are to be operated on a 30-minute headway during the day, except that, during the morning and evening rush periods service will be maintained on a 15 minute headway. A 10-cent fare is to be charged and transfers will be given from buses to connecting trolleys and from trolleys to buses upon payment of a 10-cent fare on the trolley cars.

The city of Niagara Falls favored the establishment of the proposed bus line and no opposition was expressed to the application. In a memorandum written by Commissioner Maurice C. Burritt, and approved by the commission, it was stated that "it appears that approval of the petition is in the public interest and that it will add to the convenience of the people of Niagara Falls in traveling over the streets of the city and in supplementing the present street car system."

City Agreeable

Without waiting for its new schedule of increased fares to be approved by the Public Service Commission, the International Railway decided immediately to improve service in Niagara Falls, N. Y., by inaugurating a system of more frequent service on every line in the city and by starting the work of improving and renovating its rolling stock.

Application has been made to the Public Service Commission by the company for approval of the schedule of increased fares granted the company by resolution of the City Council, meeting on March 17.

The agreement entered into between the company and the City Council grants the company a trolley fare of 8 cents a passenger on local lines; or sale of two tickets or tokens for 15 cents, and grants an increase from $1 to $1.50 on sale of commutation books of 20 tickets each between the old village of La Salle and Niagara Falls with transfer privileges to or from local lines in Niagara Falls, but commutation tickets will not be accepted as part payment for a through fare.

The railway promptly issued a statement to the effect that in appreciation for the "splendid spirit of fair dealing" that the people of the city have displayed in the settlement of the fare controversy it "has decided to do even more than it promised."

The whole matter is a lesson in good public relations not easy to match. Not only did the proposal meet with hearty approval by the public, but the attitude of the local newspapers, particularly the Niagara Falls *Gazette,* was most helpful. Evidently baiting big business has no zest for the local papers. On various occasions the *Gazette* put the matter this way:

"No contract that is confiscatory is binding. Niagara Falls does not want to take advantage of such a contract, if expressions of the people are to be accepted as indicating public sentiment.

"The Buffalo *Evening News* sees in the Niagara Falls situation a rare opportunity for this community to wallop the traction company, but fortunately we do not treat our business interests that way."

"The increase asked by the company is very reasonable, and its consent to abide by this figure for a term of at least ten years is an earnest of its good faith. The *Gazette* feels that the City Council has performed a good stroke of business for Niagara Falls. The increase in fares was inevitable, and by arriving at this very satisfactory settlement of the matter the city is saved a large sum of money in lawyers' fees, expert hire, and other costly incidentals that usually feature litigations in cases of this character."

◆

Congestion Greatest Economic Problem Before the Cities

H. M. Patton, district superintendent of the Union Electric Light & Power Company, St. Louis, Mo., was elected president of the Missouri Association of Public Utilities at the recent meeting of that body to succeed Major T. J. Strickler, Kansas City. The election took place at the closing session of the three-day convention of the association which was attended by 200 delegates from various parts of the state.

A feature of the convention was the address of Milton R. Stahl, chairman of the Missouri Public Service Commission, in which he advocated a broadening of the powers of the commission to give it jurisdiction over holding companies for local public utilities and supervision over the sale in Missouri of stock in holding companies.

Better use of existing street facilities would solve many of the traffic problems of large cities, Charles Gordon, managing director of the American Electric Railway Association, asserted in his address. He expressed the belief that existing thoroughfares should be used to their fullest extent rather than for a city to indulge in expensive street widening and expansion program.

He brought out that acute street traffic problems are manifest in all of the major cities and in many of the small cities and towns as well. He said that congestion of streets has become perhaps the greatest single economic problem confronting modern cities and that it is already having a profound effect upon the business and social life and is threatening to bring about major readjustments of property values and business locations, particularly in the central business districts.

◆

Lackawanna Plans Electric Suburban Service Sept. 15

Electric service probably will be started by the Delaware, Lackawanna & Western Railroad on the Montclair division about Sept. 15. One electric train at a time will be substituted for a steam train in the regular schedule. Operation and performance will be watched carefully and if any difficulties arise they will be ironed out before the next train is put into service. Subsequent substitutions will be made train for train until full electric service is in operation. Meanwhile, four engineers are receiving instruction on the new equipment daily. To the end that service may be begun as scheduled, the first of the new multiple-unit trains was operated at 4 p.m., on July 17. Since that time four-car and eight-car trains have been run daily between Bergen Junction and Secaucus, N. J., to test equipment and instruct trainmen. Runs have also been made along the main line from Bergen Junction to Harrison Tower.

Substation equipment is being installed according to schedule. Buildings are completed and electrical apparatus is approximately 50 per cent in place. New cars are arriving and trailers are being converted at the rate of one a day and will continue on that schedule until the completion of 141 units, each consisting of motor car and trailer.

Train Being Used for Tests on Lackawanna's New Electric Zone

Companies in Suburban New York Seek Fare Increase

The Yonkers Railroad, the Westchester Electric Railroad, and the New York, Westchester & Connecticut Traction Company, on July 30, petitioned the Public Service Commission for permission to increase their fares from 5 to 8 cents in Yonkers, Mount Vernon and other portions of Westchester County.

The petitions of all companies stated that the present rate of 5 cents does not provide a fair return on their investments and that the proposed 8-cent fare will constitute no more than a just and reasonable rate.

The Yonkers Railroad desires to charge 8 cents for rides in the city of Yonkers and in Mount Vernon where it has a line also, and to increase the fare to 8 cents in every instance where a 5-cent fare is now collected. The company states that in 1929 its revenue was $1,284,598, and that this fell short by at least $390,000 of meeting the operating expenses of the company, and that it fell short by about $325,000 of yielding a 7 per cent return.

The Westchester Electric Railroad desires to charge 8 cents instead of 5 cents for rides in the city of Mount Vernon, the villages of Pelham, Pelham Manor and North Pelham and between points where a 5-cent fare is now charged. The petition does not ask an increase for rides originating and terminating within the city of New York. This company states that its 1929 revenue of $785,349 fell short of meeting operating expenses by at least $355,000 and of yielding a 7 per cent return by at least $309,000.

The Westchester & Connecticut Traction Company desires to charge 8 cents for rides in Mount Vernon and North Pelham and between other points where a 5-cent fare is now collected. This company states that its 1929 revenue of $83,160 fell short by at least $32,500 of meeting expenses, and that it fell short by at least $28,000 of yielding a 7 per cent return to the company on its investment and property value.

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Trolleys Speeded by New York's New Stagger System

The co-ordinated "stagger" traffic light system went into effect throughout Manhattan at 7 o'clock on the morning of July 30. Control mechanisms were adjusted after the light control stopped for the night at 3 a.m. and when it went into operation again the light changes were so timed that north-and-south traffic flowed uninterruptedly for about a minute and a half, instead of two minutes as formerly and east-and-west traffic ran for about 30 seconds, instead of one minute.

To speed the movement of traffic in the Times Square district, the light tower at 45th Street was removed. This was the point from which Commissioner Whalen last year observed the results of the traffic regulations he put into effect for the theatrical district. It has stood in front of the Hotel Astor for seven years.

Changing the light mechanism to "stagger" the traffic was a simple matter of setting disks in the central control towers to revolve at constant speed with the signal systems for the various avenues and streets. Readjustments were made at the central control room in the West 30th Street station and at the auxiliary control room in the West 126th Street station.

Police Commissioner Mulrooney had observers stationed in many parts of the city. He reported gains in speed from 15 to 50 per cent. William G. Fullen, chairman of the Transit Commission, who had inspectors on the job, had a table of data showing one gain of as high as ten minutes from westbound trolley traffic on 34th Street. The Third Avenue Railways reported a 33 per cent gain in speed on the 42nd Street line, with other gains on different lines.

All reports contained assurances as well that while crosstown traffic had been speeded the gains had not been effected at the expense of the longitudinal vehicular flow. Most of the reports said that there had been some speeding up of north-and-south traffic, although to a considerably lesser degree.

William Thompson, vice-president of the Third Avenue Railway, said:

> The new system has resulted in a material increase in speed on our crosstown lines without any retarding of north-and-south traffic. In fact we have received reports of some light gains in north-and-south traffic. On the 42nd Street crosstown line the speed gain was about 33 per cent, on the 59th Street line about 19 per cent and on the 125th Street line about 15 per cent.

At the offices of the New York Railways it was announced that the crosstown trolley car movement had shown definite gains in speed, although data had not been compiled to show the actual gains. This statement also emphasized that north-and-south traffic had not been impeded.

Officials of the Fifth Avenue Coach Company said they were still checking their data, but that a preliminary survey had indicated gains in the operation of their buses.

◆

Indiana Railroad Succeeds to Union Traction Properties

INDIANA Railroad is the new name under which the electric interurban lines of the old Union Traction Company of Indiana began operating on Aug. 1.

Properties of the Union Traction Company, which were purchased at a receiver's sale in Anderson on July 2 by B. P. Shearon, secretary of the Midland United Company, have been conveyed by order of the Madison Circuit Court to the Indiana Railroad, which is a subsidiary of the Midland United Company.

The full amount of the purchase price, $3,923,933, including $376,528 in cash and the rest in bonds and other securities, was paid to Arthur W. Brady, the receiver, by the Midland United Company on July 17. The new owners, however, will not assume full control of the properties until Mr. Brady makes his final report to the court and relinquishes the receivership, probably the latter part of August.

Operation of the Indiana Railroad will be under the direction of Henry Bucher, vice-president of the Indiana Service Corporation. Mr. Bucher is the managing executive of the railway department, through which the operation of other electric railways in central and southern Indiana controlled by the Midland United Company is now coordinated.

The electric interurban lines, which will be operated under the direction of one centralized supervisory management at Indianapolis, include the line between Indianapolis and Louisville operated by the Interstate Public Service Company, the lines of the Indiana Service Corporation radiating from Fort Wayne, the line of the Northern Indiana Power Company extending from Frankfort to Kokomo and Marion, and the old Union Traction Company which now becomes the Indiana Railroad.

Co-ordination of service and schedules, which it is believed will be of benefit to the traveling public, is expected to be one of the results of the centralized control of operations of these railways.

The board of directors of the new Indiana Railroad elected the following officers at a meeting held in Chicago, on July 30:

Samuel Insull, chairman of the company.
Samuel Insull, Jr., chairman of the executive committee.
Robert M. Feustel, president.
William A. Sauer, vice-president.
Henry Bucher, vice-president and general manager.
George F. Mitchell, treasurer.
Bernard P. Shearon, secretary.
Edwin J. Booth, comptroller.

The directors of the company are: Mr. Insull, Mr. Insull, Jr., Mr. Feustel, Mr. Sauer, Mr. Bucher, Charles W. Chase and L. M. Brown.

COMING MEETINGS

Aug. 13-14—Wisconsin Utilities Association, Milwaukee, Wis.

Aug. 14—American Electric Railway Assn., Metropolitan Section, Sixth Annual Outing, Luna Park, Coney Island, N. Y.

Sept. 5-6 — Central Electric Traffic Association, Wawasee, Ind.

Sept. 10-11—Central Electric Railway Master Mechanics' Association, Miami Hotel, Dayton, O.

Sept. 17-19 — Canadian Electric Railway Association, 26th annual convention, Ottawa, Canada.

Sept. 25—Pennsylvania Street Railway Association, Casey Hotel, Scranton, Pa.

Oct. 9-11—Midwest Electric Railway Association, Miami, Okla.

Oct. 22-24—National Transportation Meeting of the Society of Automotive Engineers, Pittsburgh, Pa.

Oct. 29-30—Iowa Electric Railway Association, Des Moines, Ia.

Vote on Future of the Boston Elevated Railway

At the state election in November of this year there will be submitted to the registered voters of the cities comprising the so-called Metropolitan District, the following plans for determining the future ownership, management and operation of the Boston Elevated Railway, Boston, Mass., namely:

Plan No. 1. Return to the Boston Elevated Railway of the management and operation of its railway system by terminating public management and operation thereof.

Plan No. 2. Continuation of public management and operation of the Boston Elevated Railway in accordance with such terms and conditions as may be agreed to by the stockholders of said company.

Plan No. 3. Purchase by the Metropolitan Transit District of the whole assets, property and franchises of the Boston Elevated Railway, the same thereafter to be owned, managed and operated by said district.

The referendum will have no legal effect, but will merely inform the succeeding Legislature as to the preferences of a majority of the voters of the Metropolitan Transit District. It will be necessary for the Legislature to enact legislation to put into effect any one of the foregoing plans.

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Proposed Abandonment Under Inquiry

Engineers of the Ohio Public Utilities Commission will make a survey of the rolling stock and roadbed of the Scioto Valley Railway & Power Company to aid in determining whether the road should be permitted to abandon railway service between Columbus and Chillicothe and Columbus and Lancaster. At the first hearing, held on July 23, officials of the company testified that $200,000 would have to be expended to place the rolling stock and the roadbed in good condition. They said the company could not finance this program inasmuch as the road now is operating at a loss of $7,000 per month. Residents insist the lines are a necessity and that, under more skillful management, the system could be made profitable.

◆

Question of Jurisdiction in San Diego Hearing

The hearing scheduled to be held by the Railroad Commission in San Diego, Cal., on June 19, in the matter of the application of San Diego Electric Railway to abandon railway operation and remove its tracks in Coronado, substituting therefor through bus service over the ferries of the San Diego & Coronado Ferry Company into San Diego, was continued without taking of testimony as to public convenience and necessity. The application was amended to offer loop bus service in Coronado and continue the railway operation there as a concession to the expressed desire on the part of residents who prefer to transfer from the cars to the upper decks of the ferry boat rather than be shut in on the automobile deck in a bus.

At the hearing the City Attorney and members of the City Council said they had before them the matter of municipal operation with buses to be furnished by a proposed rival bus company on a rental basis, wherein the city was to be guaranteed against any losses for a period of five years. They requested that action on the application of the railway be postponed until they could determine what action they wished to take in the matter. It was also contended that inasmuch as the operation of the proposed bus service was entirely within the limits of Coronado, the commission had no jurisdiction, the railway being subject only to municipal control through franchise requirements. Since there is some question as to proper interpretation of the Public Utilities Act, the commission took the matter under advisement to determine its jurisdiction before hearing is to be continued.

The matter is of interest because of the attempt of private parties to enter into bus competition with established utility under the guise of municipal operation, the private parties obtaining remuneration through tolls received from ferrage of the vehicles across the Bay of San Diego, including tolls for the passengers, by means of a rival ferry company.

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A. C. Blinn in Charge of Ohio Edison Operations

Announcement Made of Official Roster of Officers for New Merger Company in Commonwealth & Southern Group Operating in Ohio

OFFICIAL announcement was made, on July 23, of the organization of Ohio Edison Company, created by the consolidation of the Pennsylvania-Ohio Power & Light Company, Northern Ohio Power & Light Company, the Ohio Edison Company, the Akron Steam Heating Company, and the London Light & Power Company. The company will be operated by divisions with the general headquarters in Akron.

A. C. Blinn in Charge

A. C. Blinn, who has been vice-president and general manager of Northern Ohio Power & Light Company for many years, will be vice-president and general manager of the Ohio Edison Company in charge of all the utility operations.

L. G. Tighe, for the last six years assistant general manager of Northern Ohio Power & Light Company in Akron, has been made a vice-president and director of the new company, and will be manager of the Akron division which includes the cities of Akron, Barberton, Cuyahoga Falls, Kent, Tallmadge, Lakemore, Northfield, Brimfield and a large number of other smaller communities.

C. S. MacCalla, formerly vice-president and general manager of the Pennsylvania-Ohio Power & Light Company, is a vice-president and director of Ohio Edison, and will be manager of the Youngstown division, comprising the cities of Youngstown, Girard, Lisbon, Salem, Struthers, Leetonia, Canfield, Columbiana, Kinsman and numerous other towns and communities.

H. E. Miller, former general manager and director of the Ohio Edison Company at Springfield, will be manager of the Springfield division, which includes Springfield, London, Marysville, Urbana, Mechanicsburg, Westville and other communities.

Other officers of the company are: H. G. Kessler, New York, comptroller; P. Murdoch, Akron, general auditor, with H. R. Bowie, Youngstown, assistant; E. G. Dunlap, Youngstown, treasurer; C. H. Lahr, Akron, secretary; L. I. Wells, Akron, E. E. Nelson and C. Wigand, New York, assistant secretaries and assistant treasurers.

B. C. Cobb the President

B. C. Cobb heads the new company as president and chairman of the board of directors. Other directors are A. F. Ayers, Akron; W. H. Barthold, New York; A. C. Blinn, Akron; W. H. Foster, Youngstown; H. E. Freeman, Springfield; J. T. Harrington, Youngstown; T. A. Kenney, New York; C. S. MacCalla, Youngstown; H. E. Miller, Springfield; J. G. Robertson, Akron; L. G. Tighe, Akron; W. L. Willkie, New York. Mr. Barthold, Mr. Kenney and Mr. Harrington are also vice-presidents, as is M. W. Arthur of New York.

Ohio Edison Company assumes all the bonds and other indebtedness of the Pennsylvania-Ohio Power & Light Company, Northern Ohio Power & Light Company, the Akron Steam Heating Company, the Ohio Edison Company and the London Light & Power Company.

A Hitch in Hitch-Hiking

THE practice of "thumbing" for rides has become an annoying business. That it is also extremely dangerous for the good-natured motorist to pick up strangers has been proved in innumerable cases.

Some of these motorists have been murdered by their "pick-ups," and many others have been beaten and robbed of money and cars. Still others have had to defend suits brought for injuries by the thumbers to whom they gave assistance, and on several occasions innocent motorists have become involved with the courts for aiding fugitives, youthful runaways and delinquent girls.

While some states have taken official action to stop ride-begging on their highways, the one way to put a stop to the nuisance is for motorists everywhere to pass the thumbers by. The only persons who can put a real hitch in hitch-hiking are the motorists themselves. Motor clubs could save some of their members much embarrassment and grief, by acquainting them of the dangers they run by picking up strangers on the highways.—*Condensed from the Cincinnati Enquirer.*

"Selling Transportation" Is Theme of Coffin Award Review

While it is impractical, of course, to make the full text of the Charles A. Coffin Award briefs available for general circulation, the American Electric Railway Association has done much to overcome this deficiency by publishing a digest in which the outstanding features of the respective briefs are set forth. The latest publication of this nature, covering the briefs submitted in the 1928 and 1929 contests, is now being distributed from the association headquarters to member companies. The book is entitled "Selling Transportation." It has been prepared under the direction of Prof. Albert S. Richey, acting for the Coffin Foundation, with a foreword by J. P. Barnes, president of the association in 1928-29.

The street railway companies which competed for the award in 1928 were: El Paso Electric Company, Gary Railways, Northern Texas Traction Company, San Antonio Public Service Company, Shreveport Railways, and Virginia Electric & Power Company. The El Paso Electric Company and the Northern Texas Traction Company were again contestants in 1929, and in addition briefs were submitted by Chicago, South Shore & South Bend Railroad, Community Traction Company (Toledo), Detroit Department of Street Railways, Houston Electric Company, and the Youngstown Municipal Railway.

Conforming to its title, "Selling Transportation" is made the central theme of the book, and the various chapters, dealing with service betterment, selling rides, going after business, new and modernized cars, the place of the bus, rolling stock and track maintenance, safety, and employee co-operation, are all edited with emphasis upon this main idea of disposing of the product of transportation.

Under the general heading of service betterment, the matter of speed receives special attention. As one of the briefs expresses it, "speed is the very essence of transportation." The Gary Railways, realizing that railways must speed up to exist, points out how it has increased its average speed from 9.11 to 9.95 m.p.h. The Detroit Department of Street Railways features its rapid transit surface line, the Jefferson Avenue Express, which, in 1928, maintained an average schedule speed of 18.5 m.p.h. over its 4.3 mile route, while the Chicago, South Shore & South Bend Railroad credits its high speed interurban service with having done much to check automobile competition.

Perhaps more than ever before is recognition given to the human element and its responsibility in the sale of service. Practically every brief submitted placed special emphasis upon this feature, and the winning companies, the Virginia Electric & Power Company in 1928 and the Chicago, South Shore & South Bend Railroad in 1929, credit their exceptionally successful records largely to this factor. There is a growing appreciation of the fact that it is the man on the platform who makes the service either satisfactory or otherwise. The efforts of the personnel have been supplemented and backed up by the efforts of the companies in cleaning and painting, and in making the physical plant more attractive.

Advertising and newspaper publicity have attained a much higher level, according to the chapter devoted to this subject. Public relations have greatly improved and, thanks to a general policy of supplementing words with actions, there is, in general, a growing feeling of mutual confidence between electric railway managements and the public and local authorities. This is made evident by the success of Houston in securing relief from jitney competition; of San Antonio, where an increase in fares was granted; and Toledo and Youngstown where notable progress was reported in securing franchises free from many of the onerous impositions of the past.

The chapter on operating economies contains much information of a general nature on this subject, while the chapters on rolling stock maintenance, track construction and maintenance and power and line economies constitute a veritable handbook of good operating practice in these important fields. Solicitude for the general welfare, health, happiness and contentment of employees, individually and as a group was manifest in all presentations. That this has been reciprocated is made evident by the more intelligent co-operation between men and management which characterizes the general trend of employee relations.

In his foreword, Mr. Barnes has aptly expressed the aim and purpose of the volume. "It is offered," he states, "with the hope that the fundamental and far-reaching policies which have characterized award submission of the last two years will prove of maximum inspiration to a maximum number of readers."

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Conspectus of Indexes for July, 1930

Compiled for Publication in Electric Railway Journal by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years	
				High	Low
Street Railway Fares* 1913 = 4.84	July, 1930 **7.97**	June, 1930 **7.97**	July, 1929 **7.76**	July, 1930 **7.97**	July, 1925 **7.27**
Electric Railway Materials* 1913 = 100	July, 1930 **136.2**	June, 1930 **138.9**	July, 1929 **147.5**	Dec., 1926 **159.2**	July, 1930 **136.2**
Electric Railway Wages* 1913 = 100	July, 1930 **231.7**	June, 1930 **231.7**	July, 1929 **230.9**	July, 1930 **231.7**	July, 1925 **222.5**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	July, 1930 **197.7**	June, 1930 **199.5**	July, 1929 **199.0**	Nov., 1928 **205.7**	July, 1930 **197.7**
General Construction Cost Eng'g News-Record 1913 = 100	July, 1930 **201.0**	June, 1930 **203.4**	July, 1929 **204.8**	Jan., 1927 **211.5**	July, 1930 **201.0**
Wholesale Commodities U. S. Bur. Lab. Stat. 1926 = 100	June, 1930 **86.8**	May, 1930 **89.1**	June, 1929 **96.4**	Nov., 1925 **104.5**	June, 1930 **86.8**
Wholesale Commodities Bradstreet 1913 = 9.21	July, 1930 **10.56**	June, 1930 **10.77**	July, 1929 **12.49**	Dec., 1925 **14.41**	July, 1930 **10.56**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	June, 1930 **147.9**	May, 1930 **150.1**	June, 1929 **154.8**	Nov., 1925 **167.1**	June, 1930 **147.9**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	June, 1930 **154.8**	May, 1930 **156.2**	June, 1929 **160.0**	Nov., 1925 **171.8**	June, 1930 **154.8**
Industrial Activity Elec. World, kw.-hr. used 1923-25 = 100	June, 1930 **115.5**	May, 1930 **119.0**	June, 1929 **135.2**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	June, 1930 **92.1**	May, 1930 **92.1**	June, 1929 **102.2**	Oct., 1929 **111.8**	June, 1930 **92.1**
Business Failures Number Liabilities, Millions of Dollars	June, 1930 1874 **114.40**	May, 1930 2083 **57.72**	June, 1929 1482 **64.15**	June, 1930 1874 **114.40**	Sept., 1928 1348 **23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Noise Elimination in Rapid Transit Studied

Under the direction of Robert Ridgway, chief engineer, the transit experts of the city of New York have been making a thorough study of proposals for the improvement of equipment, rolling stock, road ballast and subway turnstiles to eliminate all unnecessary noises. They also have under consideration the advisability of sound-deadening linings for the reduction of loud noises caused by fast operation of trains through underground tubes.

The city's engineers believe that the method of laying tracks on ties imbedded in concrete, now being used in the new subways, will be less productive of operating noises than the use of the stone or gravel ballast. The latter method, they believe, results in failure of track alignment, low rail joints and other noise-producing defects.

The engineers have designed the city's new subway cars so that they will operate with a minimum of noise. They are also studying the suggestion that subway tubes be sheathed, or partly sheathed, with some sound-deadening application or material, but thus far have come upon no practical method of accomplishing this result.

In a report to Chairman Delaney, Mr. Ridgway pointed out that the problem of eliminating noise from subway and elevated operation was studied as early as 1923 when a special committee was named. Since that time the Board of Transportation's engineers have studied surveys made by operators of the London Underground Railway in an effort to reduce operating noises.

FOREIGN NEWS NOTES

Construction of New London Subway Approved

The Select Committee of the British House of Lords has approved the preamble of the bill for the extension of the Piccadilly subway, London, from Finsbury Park to Cockfosters. The measure has already passed through the House of Commons Committee, so that, subject to the formality of the Royal assent, the London Underground Railways combine proposes to have the contract ready for inviting tenders for the work returnable by July 15. Actual work will be started not later than Sept. 1.

The London & North Eastern Railway was the principal opponent of the bill before the committees of Parliament. That company's decision to electrify its suburban lines was subject to two conditions, a satisfactory financial grant from the government under the Development Act, and a satisfactory arrangement for terminal accommodation in central London. The subway project has not killed the electrification proposals. Approval of that bill means competition by subway with that part of the Northeastern line it is proposed to electrify. Should the company not electrify its lines, the loss of traffic to the new subway will be much heavier. Final decision is not likely until the amount of state assistance the company will receive is known.

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London's New Suburban Line

The chief event of the New Year in London up to the present has been the opening of the electrified extension of the Southern Railway's suburban system, linking Wimbledon and Sutton, southwestern suburbs. During business hours trains from these terminals now run to central London every twenty minutes, and every half-hour at other times. The value of this extension will increase with the development of the St. Helier, Sutton Common, and Sutton West districts. From St. Helier station, which serves the new London County Council housing estate, central London is reached in 34 minutes. The new piece of line is 5½ miles in length, and there are six new stations. Work on the section began in October, 1927, and 24 bridges had to be built, including three foot bridges. The trains are composed of eight coaches, giving room for 112 first-class and 540 third-class passengers. Cheap weekly, monthly, and quarterly season and cheap day-return tickets are available, and will help popularize the service.

In this connection it should be noted that the electrification of three important new sections of the Southern Railway, one of Britain's railroad "Big Four," is to be completed this year, under the construction plans for 1930. The total expenditure authorized for the year is $21,500,000, about one-third of which will go to pay for new rolling stock. Approximately $3,000,000 will be spent on electrification.

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Scenic Trips by Electric Railway in Japan

Electric railways operating from Osaka, Japan, to many suburbs, including Kyoto, Kobe, Wakayama and Nara, enable the tourist to visit many temples, shrines, tombs and scenic points. The Daiki Railway goes to Nara, the ancient capital of Japan, where are the Kasuga Shrine, the Todaiji Temple and the great Buddha. Nara is only a 50-minute ride from Osaka. The trip on the Keihan permits the visitor to see the mausoleum where the late Emperor is buried, and visit Lake Biwa and the cherry blossom region of Mount Arashiyama. Koshien Field with a grandstand and bleachers seating 80,000 persons, is reached on the Hanshin line. Not only have the Japanese gone in for utility as instanced by their rapid transit lines, but they have not neglected the aesthetic side as one of the two accompanying pictures makes plain.

Incidentally it should be noted that plans are being made for further electrification of the Japanese government railways. The portions under consideration are those between Tokyo and Yokosuka, Kozu and Atami, Ueno and Abiko, Yokohama and Hachioji, Tachikawa Asakawa, Kioto and Nara, Tennoji and Umeda, Otsu and Akashi. Details of the plans are being worked out by a special committee in the railway office. When electrification is completed, it is expected to have a considerable influence on the passenger traffic of the existing interurban lines. Overhead contact lines have already been installed on the section between Tokyo and Yokosuka and between Kozu and Atami.

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Subway Financing for Buenos Aires Arranged

Harris, Forbes & Company, New York, have underwritten financing of a new terminal and subway project in Buenos Aires. Financing will be $12,000,000 three-year 6 per cent notes of South American Railways, which will be convertible into common stock with purchase warrants attached of the latter company. This financing, with proceeds of $2,500,000 preferred stock sold recently, will enable South American Railways to purchase $14,500,000 three-year notes of Buenos Aires Central Railroad & Terminal Company, which is constructing and will operate a subway and terminal project to give it and its interconnecting systems direct access to the heart of the business district of Buenos Aires.

◆

Rome, Italy.—Electrified lines of the Italian State Railways now number 1,625 kilometers, or about 10 per cent of the mileage of the entire state railway system. However, they carry 20 per cent of the total traffic. The use of electricity now permits the state railways to save about 600,000 metric tons of coal annually or slightly less than one-quarter of that which is burned for steam traction. During the past year, 100 locomotives were purchased by the state railway system. Of these 85 were electric.

◆

Mendoza, Argentina — The Mendoza Empresa de Luz y Fuerza, furnishing electric power, light and electric railway service to Mendoza, the fourth largest city in Argentina, has been acquired by the American & Foreign Power interests, which have concluded negotiations for the acquisition also of properties owned by the Compania de Electricidad de la Provincia de Buenos Aires in the cities of Mar del Plata, San Pedro, San Nicolas, Junin, Azul and San Luis. Mendoza, with a population of 175,000, is the metropolis of western Argentina.

A Difficult Piece of Diversion Work on the Elevated Electric Railway, Now Under Construction in Kobe, Japan

White Tile, Electric Direction Signs and Modern Lighting Fixtures Are Features of the Kobe-Arima Railway Station

PERSONAL MENTION

A. B. Paterson New President in New Orleans

A. B. Paterson, who has been vice-president and general manager of the New Orleans Public Service, Inc., New Orleans, La., has been elected president of the company to succeed Herbert B. Flowers, resigned. Mr. Paterson has already been named to the vacancy by the board of directors, and will assume his new duties immediately. No action has been taken as yet with regard to the position left vacant by Mr. Paterson's promotion.

The new president of Public Service, Inc., has been with the company for the past ten years, and is widely known in the public utility field. He entered the business in 1905 when he became connected with the Meridian Light & Railway Company, where he remained twelve years as vice-president and general manager.

A. B. Paterson

He went to New Orleans in 1917 as representative of Henry L. Doherty & Company, operators of Cities Service Company of New York and other large utility concerns. Later he entered the employ of Isidore Newman & Sons, operating utility properties in New Orleans and other Southern cities.

In 1920, Mr. Paterson became associated with old New Orleans Railway & Light Company, predecessor of the New Orleans Public Service, Inc., as engineer in an advisory capacity, and soon after the reorganization of the company, under the name of New Orleans Public Service, Inc., was appointed general manager. Later he was elected a vice-president of the company, and last year was made a member of the board of directors.

◆

Carl H. Schildgen North Shore Industrial Agent

A new phase in an organized effort to locate new industries in the territory served by the Chicago North Shore & Milwaukee Railroad and associated lines has been entered by appointment of Carl H. Schildgen as industrial agent in charge of industrial development on the North Shore and the Chicago, Aurora & Elgin Railroad. Charles G. Finnegan has been named assistant industrial agent on both roads by Col. R. H. James, vice-president in charge of traffic.

Mr. Schildgen was formerly general freight agent of the North Shore Line and Mr. Finnegan has been actively identified with industrial development on the North Shore Line for some time.

Gorman Bennett has taken over Mr. Schildgen's former duties in addition to his own work in charge of less-than-carload freight business.

◆

Robert Ridgway to Assist in Chicago Subway Work

Robert Ridgway, chief engineer of the Board of Transportation of New York City, was appointed on July 14 chief consulting engineer of the Chicago subway. He will serve Chicago with the consent of the Board of Transportation.

Mr. Ridgway has been chief engineer of the Board of Transportation since its organization in 1924. When he became associated with the old Rapid Transit Construction Commission in 1900 in building the New York's first subway he had already achieved a record in railroad construction in the West and in building the New York City aqueduct for water supply.

His advice has frequently been sought on subway building in European and South American cities and he has made frequent trips abroad to study rapid transit. In 1927 he aided engineers in the location of the bridge across San Francisco Bay. He was also a member of the commission which picked the Boulder Dam power site. Last year he was a delegate to the World Engineering Congress in Tokyo.

◆

L. V. Johnston Master Mechanic at Peoria

Leonard V. Johnston, formerly in charge of maintenance of buses for the Peoria Division of the Illinois Power & Light Corporation, has been appointed master mechanic, succeeding A. T. Leech, deceased. Mr. Johnston went to Peoria in 1915 as maintenance man and engineer for several different power plants. In 1921 he went to work for the Illinois Traction System at the Peoria plant as maintenance man and engineer. Four years later he was promoted to the position of chief engineer. He was placed in charge of the maintenance of buses in 1929.

Mr. Johnston's career has been a varied one. In 1906 and 1907 he was in the employ of the Thomas Fee Construction Company, Chicago, building a dam across the St. Croix River at St. Croix Falls, Wis. From 1907 to 1910 he was in train service on the Northern Pacific between St. Paul and Duluth. After three years of this he worked as construction foreman for the Hydraulic Engineering Company on the building of the Keokuk dam at Keokuk, Iowa. Thence he went to Peoria.

C. D. Emmons President of the Hudson Tubes

Charles D. Emmons, formerly president of United Railways & Electric Company of Baltimore, has been elected president of Hudson & Manhattan Railroad, New York, effective on Sept. 1, succeeding Oren J. Root, resigned.

Mr. Emmons has had long experience in public utility and railroad work. Having graduated in 1892 from the University of Pittsburgh, with the degree of civil engineer, Mr. Emmons during the following nine years served in the engineering department of the Pennsylvania Railroad. From 1901 to 1903 he served as general superintendent of the Lafayette Street Railway, Lafayette, Ind., and from 1903 to 1911 was general manager of the Ft. Wayne & Wabash Valley Railway, Fort Wayne, Ind. In the succeeding four years he was with the Chicago, South Bend & Northern Indiana Railway.

In 1916 Mr. Emmons became vice-president and general manager of the Boston & Worcester Street Railway, and in 1918 general manager of the Boston Elevated Railway. From 1919 until his recent resignation he was president of the United Railways & Electric Company of Baltimore.

C. D. Emmons

In 1922-23 Mr. Emmons was president of the American Electric Railway Association.

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K. D. Pulcipher in Charge of Pennsylvania Publicity

K. D. Pulcipher has been made manager of the publicity department of the Pennsylvania Railroad. He succeeds G. B. Harley, who has been appointed special assistant to the vice-presidents.

Mr. Pulcipher has been editor of the *Pennsylvania News*, Western region edition, the employee semi-monthly newspaper of the railroad. He was a staff writer for the Associated Press prior to his connection with the railroad.

Ray D. Casey, formerly special publicity representative of the Pennsylvania in Philadelphia, succeeds Mr. Pulcipher as editor of the *Pennsylvania News* in Chicago. G. E. Payne has been appointed assistant publicity manager in Philadelphia.

T. H. Tutwiler Withdraws from Active Business

T. H. Tutwiler, president of the Memphis Street Railway, Memphis, Tenn., for 25 years, and president of the Memphis Power & Light Company since its reorganization seven years ago, has resigned both of these posts as part of his plan to withdraw from all active participation in business as an executive.

Mr. Tutwiler's most outstanding contributions to the electrical industry were in the railway field, where he has been long recognized as an organizer and builder. A Southerner by birth—a Virginian—his first efforts were in that section of the country with the Georgia-Pacific Railway and the Louisville, New Orleans & Texas Railroad. From 1892 to 1901 he was engineer in charge of the larger part of the New Orleans Street Railway system. He then became associated with Ford, Bacon & Davis as engineer of the Birmingham Street Railway, and was also associated with Ford, Bacon & Davis as one of the engineers in charge of converting the railway system of the two Kansas Cities from cable to electric power. In 1903 and 1904 he had charge of the rehabilitation of the Nashville Street Railway system, being associated with Ford, Bacon & Davis in that work also.

T. H. Tutwiler

In 1905, at the invitation of the Newman interests, Mr. Tutwiler removed to Memphis as vice-president and operating general manager of the Memphis Street Railway, of which he became president in 1906. It was through his efforts and ability that the system was placed on such a solid basis of operation that it conspicuously withstood the harassing conditions which afflicted practically all electric railway systems following the World War. He practically rebuilt the entire system of the Memphis company. On Jan. 1, 1923, at the termination of the receivership of the Memphis Gas & Electric Company, Mr. Tutwiler was made president of the reorganized company, known as Memphis Power & Light Company. He is a member of the American Society of Civil Engineers, Engineers Club of Memphis and Louisiana Engineering Association.

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E. L. Moore, who succeeds the late G. R. Millican as general superintendent of the Evansville & Ohio Valley Railway, Evansville, Ind., has been in the employ of the company for 22 years. In 1908 he went to Evansville from his home city of Columbus, Ind., where he was employed by the Interstate Lines. At Evansville he became trainmaster and later superintendent of transportation for the Evansville & Ohio Valley Railway.

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J. R. Snider Chief Operating Executive at Grays Harbor

J. R. Snider, veteran southwest Washington utility executive, is the new vice-president and general manager of the Grays Harbor Railway & Light Company. Mr. Snider, manager of the Willapa Electric Company, Raymond, Wash., for many years, will retain his position as head of the neighboring utility in addition to his responsibilities as general manager at Grays Harbor. He also will continue as active head of the Western Washington Electric Light & Power Company.

Mr. Snider has been connected with the electrical industry in western Washington since 1912 when Sanderson & Porter did development work on Willapa harbor. He became manager of the Willapa Electric Company in 1917, and has since continued in that capacity.

Mr. Snider is a native of Wisconsin. He was graduated from the law school of the University of Wisconsin, and was admitted to the bar in that state.

Mr. Snider succeeds the late W. W. Briggs as head of the electrical operations on Grays Harbor, directed, since the death of Mr. Briggs on Dec. 9, 1929, by the other officers and department heads.

◆

David E. Matthews South Shore Superintendent

David E. Matthews has been appointed general superintendent of the Chicago, South Shore & South Bend Railroad to succeed J. K. Gray, retired, effective Aug. 1.

Mr. Matthews goes to the South Shore Line with a background of more than 40 years of practical railroad experience. He was connected with the Pennsylvania Railroad for 21 years, starting as a brakeman and becoming successively freight conductor, passenger conductor, yardmaster, and assistant to the superintendent, doing special supervisory work. He has been railroad inspector and examiner for the Public Service Commission of Indiana since its creation, and with its predecessor, the old Railroad Commission since 1905.

Mr. Matthews' whole career has been closely identified with railroad operation, including the investigation of accidents, handling of traffic and inspection of equipment. He has been active in the promotion of safety to passengers and employees on the Pennsylvania System and later in connection with his work for the Public Service Commission.

Mr. Gray, who is retiring, has served as general superintendent of the South Shore Line for the past thirteen years. Previously he was superintendent for six years, and assistant superintendent for one year.

W. D. Kyser Heads Memphis Utilities Including Railway

W. D. Kyser, a Memphis lawyer, has been elected president and general counsel of the Memphis Power & Light Company. His election followed the resignation of T. H. Tutwiler, president of the company since its reorganization seven years ago. Mr. Kyser also has been named president of the Memphis Street Railway, a subsidiary. He has been president of the West Tennessee Power & Light Company for nearly two years and vice-president and attorney for the Memphis Natural Gas Company. He will retain both offices. The West Tennessee Power Company is a member of the Electric Bond & Share group with the Memphis Power & Light and the Memphis Street Railway. Thus Mr. Kyser becomes the dominant figure in the principal public utilities at Memphis. He will retain his partnership in the law firm of Wilson, Kyser, Armstrong & Allen.

W. D. Kyser

Mr. Kyser has practiced law in Memphis for more than twenty years. He was born in Richmond, Ala., on July 17, 1882, and received his early education there. He was graduated from the University of Alabama in 1903 with the degree of Bachelor of Arts. Later he earned an L.L.B. degree from Cumberland University.

Entering the practice of law in Memphis after leaving Cumberland, he became associated with the firm of Carroll & McKellar in Memphis, and, in 1909, formed a partnership with Mr. McKellar, now United States Senator.

Senator McKellar and Mayor Overton have retired from active membership in the law firm since entering politics. Judge Julian Wilson and Walter Armstrong only recently became partners with Mr. Kyser and Mr. Allen.

Mr. Kyser has made only one venture into politics—when he served as United States District Attorney for the western district of Tennessee from 1917 to 1921.

◆

L. Mackinnon, general manager of Glasgow Tramways, and F. A. Fitzpone, general manager of Edinburgh Tramways, have been elected president and vice-president respectively of the Scottish Tramways & Transport Association for the ensuing year.

H. B. Flowers Resigns from New Orleans Public Service, Inc.

Herbert B. Flowers, president of New Orleans Public Service, Inc., New Orleans, La., since 1923, has resigned as chief executive of the company, to engage in business in New York in the fall.

Mr. Flowers has been connected with utility concerns for the past 30 years. He assumed the presidency of Public Service in April, 1923, soon after the reorganization of the New Orleans Railway & Light Company, succeeding Mr. Hecht, who had been acting as president pending the selection of a head for the enterprise.

He went to New Orleans from Baltimore, where he was then vice-president and general manager of the United Railway & Electric Company. Prior to his Baltimore connections, Mr. Flowers had spent seven years with the electrical and transportation departments of the Detroit United Railway.

H. B. Flowers

As head of New Orleans' largest enterprise, Mr. Flowers has been prominently identified with the civic and commercial life of the city, taking an active part in the work of the community chest, the Boy Scouts, and other organizations. He is also chairman of the industrial bureau of the Association of Commerce, and has actively assisted in the work of the national advertising committee of the association, having been in charge of the temporary offices opened by the organization in Chicago and in New York to establish contact with Northern industrial leaders.

◆

Messrs. Woodworth and Smith in New Vanadium Posts

C. B. Woodworth, who has been manager of the western division of Vanadium Corporation of America at Chicago, has been appointed manager of the railroad division of the corporation. His headquarters will continue in Chicago.

Walter Smith has been appointed assistant manager of the railroad division of Vanadium Corporation. He will also make his headquarters in Chicago.

Mr. Smith was graduated in mechanical engineering, Cornell University, 1909. He entered railway service with the Chicago, Rock Island & Pacific, and subsequently served the Baltimore & Ohio and the Chicago & Northwestern in various supervisory capacities.

In 1916 Mr. Smith entered the service of Pyle-National Company, Chicago, leaving this company for service in the American Expeditionary Force. After the armistice, he was associated with the Inter-Allied Railroad Commission and supervised the transfer of cars and locomotives in Germany in accordance with reparations agreements.

Upon his return to this country, Mr. Smith resumed his service with the Pyle-National Company, with which he was engaged as special representative on sales and service work until his association with Vanadium Corporation of America.

◆

Brooklyn Man to Instruct Buenos Aires Operators

Theodore Francis Kramer, instructor of motormen for the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., has left for South America to take charge of the Buenos Aires Central Railroad Company's operating force. Just previous to his departure his associates presented him with a handsome traveling bag, with all the necessary toilet requisites, a fitting reminder of their good wishes for his welfare. The Buenos Aires Central Railway is getting ready to operate its newly built subway in Buenos Aires, and asked one of the engineers of Dwight P. Robinson & Company to designate a man from the Brooklyn company who could take charge of their operative force, and give them the necessary instruction on the Westinghouse Air Brake System. Mr. Kramer was the one decided upon. He was approached and accepted the post, the Brooklyn company giving him the needed leave of absence during the temporary assignment to the system at Buenos Aires.

◆

Giuseppe Faccioli Retires From Active Service

Giuseppe Faccioli, widely known electrical engineer, has relinquished his duties as Pittsfield works engineer and associate manager of the Pittsfield works of the General Electric Company and assumed the position of consulting engineer.

Born in Milan, Italy, Giuseppe Faccioli came to this country more than 25 years ago. He was employed by the New York Edison Company and later by the Interborough Rapid Transit Company. He then became a designing engineer for the Crocker-Wheeler Company. It was during the latter period that he met William Stanley, then wrestling with his new alternating current generator. Mr. Faccioli figured to the precise amperage which a given machine would deliver, whereas anywhere within 10 per cent would have been considered remarkable.

Soon after that be came associated with Mr. Stanley at the latter's home in Great Barrington. In 1908 he became identified with the Pittsfield works of the General Electric Company where his mathematical genius proved unusually valuable in all problems pertaining to the products of that plant, mainly transformers. Mr. Faccioli also spent considerable time at Schenectady where he was associated with the late Dr. Charles P. Steinmetz.

H. W. Smith Succeeds Late A. E. Harvey at Kansas City

Howard W. Smith, connected with the engineering and way and structures department of the Kansas City Public Service Company, Kansas City, Mo., since 1911, has been appointed to the office of superintendent of way and structures with that company, to fill the vacancy caused by the death of A. E. Harvey.

Before his entry into the street railway business, Mr. Smith was widely known on the steam roads of the Northwest. He pioneered in the survey for the Puget Sound division of the Chicago, Milwaukee & St. Paul road. He went to the Kansas City property as an assistant engineer, and served in that capacity until the organization of the Kansas City Railways under the direction of Philip J. Kealy when he was made assistant superintendent of way and structures, directly under Mr. Harvey.

H. W. Smith

In 1926, when the Public Service Company took over the property and a city-wide program of reconstruction was started under the direction of a construction department organized for the purpose, Mr. Smith was appointed superintendent of way and structures. The construction department was placed under the direction of Mr. Harvey.

When the reconstruction work was complete in 1928, the construction department was disbanded and Mr. Harvey was again returned to the head of the way and structures department with Mr. Smith as his assistant.

Mr. Smith was born in Grand Rapids, Mich., in 1883. There he lived until 1903 when he went to Kansas City. From 1902 until 1906 Mr. Smith was actively engaged in road survey work in Missouri and in Michigan. From 1906 to 1909 he was resident engineer in the construction of the Pacific Coast extension of the Chicago, Milwaukee & St. Paul Railroad.

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W. C. Ludwig, superintendent of transportation for the United Railways & Electric Company, Baltimore, recently completed 50 years of service with the Baltimore system and was tendered a dinner by the line superintendents of the company. He became connected with the system as a hill-boy for the City Passenger Railway.

Chairman of Toledo Control Board Resigns

W. W. Knight, a member of the board of street railway control at Toledo, Ohio, for nearly ten years, and recently the chairman of the board, has submitted his resignation to Mayor W. T. Jackson due to his change of residence. Mr. Knight helped to draft the Milner ordinance, under which the Community Traction Company operates, and has continued to serve as one of the three members of the board ever since.

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Frank E. Belleville Made Secretary at Louisville

Frank E. Belleville has been elected secretary of the Louisville Railway, Louisville, Ky., to fill the vacancy created by the resignation of Samuel Riddle. Mr. Belleville will retain his position as general auditor in addition to acting as secretary.

Mr. Belleville was born in Rutland, Vt., on Dec. 18, 1883. He was connected with the Rutland Railway, Light & Power Company from 1901 to 1907, at which time he went with the United Traction Company, Albany, N. Y. He remained with this company until March, 1909, when he became auditor of the Schenectady Railway, Schenectady, N. Y. In 1920 he went to Louisville as general auditor of the Louisville Railway and subsidiaries.

F. E. Belleville

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J. G. Naughton in New Office With Indiana Interurban

John G. Naughton has been appointed general freight and passenger agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., to succeed John H. Crall, resigned.

Mr. Naughton started his railway career as secretary to the superintendent of the Lake Erie & Western Railroad at Lafayette, Ind., in 1908. He entered the employ of the T. H. I. & E. several years later as chief clerk of the traffic department. In 1929, he was made assistant general freight and passenger agent and succeeded Mr. Crall on June 1 of this year.

Mr. Naughton is a member of the storage and demurrage committee of the Central Electric Traffic Association and of the Traffic Club of Indianapolis.

R. E. Cosgrove

"Bob" Cosgrove Relinquishes Post at Springfield

Robert E. Cosgrove has resigned as superintendent of the traffic department of the Springfield Street Railway, Springfield, Mass., effective July 31. Oversight of traffic will be vested in H. M. Flanders, general manager.

"Bob" Cosgrove is known far and wide in the Springfield-Worcester district, largely because of his connection with the railways there, which began in 1906. At one time seventeen companies in the railway field were affiliated with the group with which he was identified. In his post of freight and passenger agent in charge of passenger traffic, freight traffic, tariffs, rates and other similar matters, he was for many years the contact man of the company. He has acted in the same capacity up to the present time and has made up all tariff rates and schedules of all companies with reference to fares and fare collections, and he had direct charge of trolley freight until that service was abandoned a few years ago. Mr. Cosgrove also devised and placed in operation the present system of transfers and tickets in Springfield and Worcester.

"Bob" Cosgrove was born in Winchester, Mass., Sept. 24, 1885. He was graduated from Winchester High School and Burdette College, Boston. He held a position as stenographer with the Corporation Trust Company, Boston, and entered the employ of the New England Investment & Securities Company, controlling the Springfield, Worcester and other electric railways, on Dec. 13, 1906, as stenographer and order clerk in the office of J. F. McCabe, purchasing agent.

When the Legislature of Massachusetts passed a law which forced the New Haven Railroad to divest itself of all of the electric railways in Massachusetts, the offices then in the South Station Building, Boston, were moved to Springfield. This occurred Sept. 24, 1908.

At the time of the removal to Springfield, "Bob" acted as stenographer to C. V. Wood, general traffic manager. When Mr. Wood was made vice-president of the companies, Mr. Cosgrove was appointed freight and passenger agent, in charge of passenger traffic, freight traffic, tariffs, rates, etc.

R. L. Hermann Heavy Traction Representative

R. L. Hermann, formerly transportation manager of the Southwestern district of the Westinghouse Electric & Manufacturing Company, has recently been appointed heavy traction representative, with headquarters in New York. With the exception of three years of service in the army, he has been identified with the Westinghouse Company continuously since his graduation from the University of Illinois in 1915.

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C. J. Roggi on Journal Staff

Charles J. Roggi has joined the staff of Electric Railway Journal as assistant editor. Mr. Roggi, a recent Massachusetts Institute of Technology graduate, directed his entire collegiate training toward the field of transportation.

His work at M.I.T. began in 1925 with his enrollment in the five-year co-operative course in electrical engineering during which he obtained about 68 weeks of co-operative practice with the Boston Elevated Railway. This practice was in the nature of a student apprentice course in which he spent some time in practically every department of the company.

C. J. Roggi

Not content with that, he attended the Harvard School of Business Administration during his last year at "Tech." There, as a special student, he took courses in traffic management and public utility management. He was graduated from M.I.T. this year with B.S. and M.S. degrees. Mr. Roggi was born in Brooklyn, N. Y., in 1907.

◆

Major James A. Fagan Retires

Major James A. Fagan, for 31 years an engineer with the Ohio Valley Electric Railway, Huntington, W. Va., and for many years chief engineer and engineer of maintenance of way of the company, has resigned. Major Fagan is now on a vacation in the West. He went to Huntington when the railway, then in its infancy, was owned by the late Senator J. M. Camden and his associates. In his early days with the company he supervised the building of the carhouses at Huntington and at Ashland and Kenova and has since taken an active part in practically all improvements carried out by the company.

Thomas Nicholl Will Succeed Mr. Scullin With Cleveland Road

Terance Scullin, veteran superintendent of buildings and equipment of the Cleveland Railway, Cleveland, Ohio, retired on pension July 31 under the company's retirement and benefit plan. Mr. Scullin has been in the employ of the railway for 42 years. He started under the late John J. Stanley when the latter was his father's assistant on the old Broadway & Newburgh Railway.

Mr. Scullin had been superintendent of buildings and equipment since 1909 and is responsible for many of the mechanical advances made by the company, including the development of the Peter Witt type of car.

Dr. George D. Upson, chief of the medical division of the accident department, will retire at the same time. He has been in the employ of the company for more than twenty years.

Mr. Scullin will be succeeded by Thomas Nicholl, who joined the research department of the company in 1929. Mr. Nicholl received his engineering education at the University of Michigan and until 1917 was superintendent of a utility property in Indiana operating in the power and railway fields. During the World War he was an infantry captain and later was superintendent of equipment of the Union Traction Company of Anderson, Ind. He is chairman of the committee on equipment of the American Electric Railway Association. He was also the first president of the Central Electric Railway Equipment Association, and is now chairman of that association's standardization committee.

Dr. J. G. Jones, who has been in the medical division of the Cleveland Railway since 1922, will succeed Dr. Upson.

Another Cleveland Railway promotion announced by President Alexander is the appointment of J. W. Kellison as assistant superintendent of buildings effective Aug. 1. Mr. Kellison was the first man employed by Colonel Alexander when the latter built the power plant for Tom L. Johnson's 3-cent fare line. He has been with Colonel Alexander ever since, serving in the executive department from 1920 to the present time.

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C. T. Long Succeeds J. A. Fagan at Wheeling

C. T. Long, engineer of the Public Service Company, Portsmouth, Ohio, has been appointed chief engineer of the southern division of the Ohio Valley Electric Railway. He will succeed Maj. James A. Fagan, who recently resigned. The division over which he will have supervision includes Huntington, Ashland, Portsmouth, Ironton and Wildwood, N. J.

Other changes in the personnel of the organization included the appointment of Carl J. Phipps, general superintendent to succeed Mr. Long as manager of the Portsmouth Public Service Company, a subsidiary.

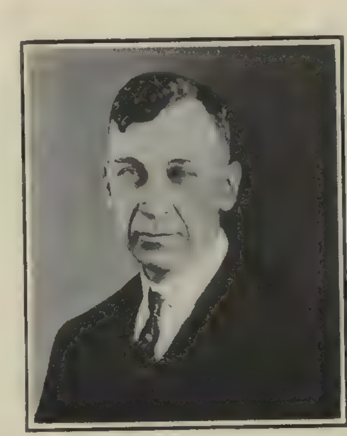
Arch J. Riggell has been made assistant to the general manager in charge of transportation and Ham Adams, formerly in charge of personnel, will become sales manager.

OBITUARY

A. E. Harvey

Alfred E. Harvey, superintendent of the way and structures department of Kansas City Public Service Company since April, 1911, died on July 3. Mr. Harvey was appointed to the position by the late John M. Egan when Mr. Egan was at the head of the railway. He had been previously associated with Mr. Egan in the steam railroad work as an engineer. Mr. Harvey also served the Chicago, Burlington & Quincy, the Chicago Great Western and the Kansas City Southern roads.

When the present operators of the Kansas City railway took over the property following the reorganization there, a special department known as the construction department was established to take charge of a city-wide reconstruction program. Mr. Harvey was placed in charge of the new department. The Mill Street viaduct on the Dodson line—one of the city's most ornamental bridges—was also constructed under Mr. Harvey's supervision.


A. E. Harvey

Mr. Harvey was the pioneer of present day track construction. Many of his experiments with steel and concrete in track work were nationally observed. He also developed many of the labor saving machines now in use on track work and paving projects. His first experiments were made on the Main Street track in 1912—the first concrete track laid in Kansas City. At that time the steel tie had not been fully developed and part of the Main Street work was poured over standard oak ties. Individual steel ties were, however, used in that portion of the Main Street track adjacent to the Union Station and on the viaducts and its approaches near the Station.

Another of Mr. Harvey's early experiments with concrete track construction was along Prospect Avenue from 39th to 48th Street. There track is constructed for half of its length over wood ties and for the rest of the distance over what is known as the twin steel tie. The surfacing of this track also introduced an innovation in construction work. This job was topped with crushed granite made from old paving blocks. For the crushing of these blocks Mr. Harvey designed a special crusher. Many of the practices of bonding the rails in city street track construction now in use were the outcome of experiments made by Mr. Harvey in Kansas City.

Mr. Harvey was also the author of many articles on track construction, and was a frequent contributor to Electric Railway Journal.

Mr. Harvey was born at Waverly, Ill., in 1868. He was a graduate of the civil engineering school of the University of Illinois, class of 1894. In 1893 Mr. Harvey served as assistant engineer in charge of water supply and sewers at the Columbian Exposition in Chicago.

At the time of his death Mr. Harvey was president of the Kansas City chapter of the American Society of Civil Engineers and a member of the standing committee on way and structures of the American Electric Railway Association. He was a past president of the Engineers Club of Kansas City.

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B. O. Brill

Byron O. Brill, general purchasing agent of the J. G. Brill Company, died suddenly in the Presbyterian Hospital, Philadelphia, on July 21, after a short illness.

Byron Brill joined the Brill company in 1898, and with the exception of six years from 1900 to 1906, when he was with the General Electric Company, at Schenectady, he has been connected with the Brill company. After having charge of lumber purchases, which department he joined in 1908, he was made general purchasing agent in May, 1922.

Mr. Brill was born on Aug. 23, 1879, at Williamsport, Pa. He was educated in the public schools of Williamsport and Philadelphia, and was graduated from the Spring Garden Institute of Philadelphia. His father, George Brill, was one of four sons of J. G. Brill, the founder of the company bearing his name.

Mr. Brill was a charter member of the Purchasing Agents' Association of Philadelphia, a member of the Academy of Fine Arts, Manufacturers Club, C. M. Swain Lodge 654 F. & A. M., Philadelphia Consistory A.A.S.R., and Lulu Temple A.A.O.N.M.S.

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C. W. Dickerson

Clarence W. Dickerson, vice-president and secretary of the Timken-Detroit Axle Company, died on July 1 at his home in Detroit. Mr. Dickerson was born on Dec. 28, 1859, at Brooklyn, N. Y. He was educated in the public schools of Springfield, Mass., and Brattleboro, Vt. He went to Detroit in 1910 as assistant treasurer of the Timken-Detroit Axle Company. His other business affiliations at the time of his death were vice-president and a director of the Michigan Mutual Liability Company, and a director of the Michigan Industrial Bank. For twenty years previous to going to Detroit, Mr. Dickerson was associated in executive capacities with Eastern bicycle companies.

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William H. McCurdy, 77 years old, one of the organizers of the Evansville & Ohio Valley Railway, Evansville, Ind., and a director in the company, died recently at San Diego, Cal.

INDUSTRY MARKET AND TRADE NEWS

Brooklyn Inaugurates Trolley Bus Service

On Wednesday, July 23, the Brooklyn & Queens Transit Corporation placed in service on the Cortelyou Road line the first trolley bus to be operated in Brooklyn. Operation is between Flatbush Avenue and Coney Island Avenue over a former electric railway route, and is in conjunction with a gasoline bus so that passengers can compare the merits of the two vehicles.

The trolley bus, which is supplied by the Twin Coach Corporation, is provided with leather-upholstered seats of the bucket type, with a seating capacity of 40 passengers. It is equipped with 50-hp. motors and has automatic control. A front entrance door is provided, with treadle-operated rear exit.

Operation on the Cortelyou Road line is of an experimental nature to enable patrons as well as the operating staff of the trolley company to make a practical test of this form of conveyance under actual operating conditions. Pamphlets describing the desirable features of the new vehicle are being distributed to passengers, and suggestions and criticisms are invited from the public.

Additions to Bates Expanded Steel Corporation

The Bates Expanded Steel Corporation, recently organized, has taken over the business of the Bates Expanded Steel Truss Company. The management is making changes in policies designed to greatly strengthen the corporation's position in its field. New designs of parallel expanded poles have been produced, and the company is actively developing a division for the manufacture of high-voltage transmission structural towers.

Judson F. Stone, of Chicago, is president of the new corporation, and Albert J. Bates, Jr., is vice-president and general manager. Mr. Bates has been closely identified with all activities of the company since 1917.

The corporation's facilities include a designing and engineering department, a large expanding and structural plant, and a galvanizing plant. Recent orders received include a large galvanized structural tower order from the Byllesby Engineering & Management Corporation for the Louisville Gas & Electric Company.

General Electric Sales at High Volume

General Electric Company sales billed for the first six months of 1930, announced by President Gerard Swope, amounted to $197,229,346, compared with $194,353,308 for the corresponding period last year. Profit available for dividends on common stock for the first six months of 1930 was $29,273,276, compared with $30,740,768 for the similar six months last year, or equivalent to $1.01 per share on outstanding common stock this year and $1.07 per share for the first half of 1929.

Valspar Expands

The Valspar Corporation has merged the Detroit Graphite Company of Detroit, Mich., and the Dominion Paint Works, Ltd., of Walkerville, Ont., with its already existing units. These two companies are wholly complementary to the other companies in the Valspar Corporation, both in the lines which they manufacture and in the location of their plants. The plans for consolidating the activities of the Detroit Graphite Company and the Dominion Paint Works with those of the other units of the Valspar Corporation do not contemplate any change in management or loss of identity in these two new subsidiaries.

The headquarters of the Detroit Graphite Company will remain in Detroit. Certain of its officers will be elected directors of the Valspar Corporation.

The Valspar Corporation now includes: Valentine & Company; Detroit Graphite Company; Cie, des Vernis Valentine; Con-Ferro Paint & Varnish Company; Dominion Paint Works, Limited; together with several subsidiary companies located both within the United States and abroad. The corporation also has plants in England and Australia.

Active Demand for Buses Among the Electric Railways

One hundred and sixty additional Type "250" Yellow buses, for which orders were placed some months ago, have been delivered to Public Service Co-ordinated Transport, Newark, N. J. The same company also received five Mack Model AB, 25-passenger buses, and three Mack Model AB, 29-passenger buses, all for city service and all equipped with gas-electric drive.

General Motors Truck Company also reports delivery of fifteen Type Z-225 buses to the Fifth Avenue Coach Company, of New York City, and ten Type "250," 33-passenger observation coaches to the Philadelphia Rapid Transit Company. Other General Motors Truck deliveries include five Type W, 21-passenger buses for city service to the Waverly, Sayre & Athens Traction Company, Waverly, N. Y.; five Type Z, 38-passenger city service buses to People's Motor Bus Company, St. Louis, Mo.; one of similar type to the Boston Elevated Railway; four Type W, 21-passenger buses, and six Type Z, 29-passenger coaches to Coast Cities Railway, Asbury Park, N. J.; and a Type W, 21-passenger coach and a Type Y, 29-passenger parlor bus to Union Street Railway, New Bedford, Mass.

Twin Coach deliveries include ten urban type buses to Schenectady Railway Company, six of similar type to Brooklyn Bus Corporation, and one to Boston Elevated Railway. Seven trolley buses were delivered to Chicago Surface Lines, and a parlor reclining bus went to the Washington Motor Coach Company, of Seattle.

Brooklyn Bus Corporation also took delivery of one Mack Model AB, 29-passenger bus and one Mack Model AC, 29-passenger bus, both of the city service type, and four Mack Model BK, 38-passenger city service buses. Mack International Motor Truck Corporation made delivery of five Model BG chassis

Electric Locomotives for Great Northern Railroad

Three 260-ton motor-generator type single-phase electric locomotives shown above are being tested for regenerative electric braking on the test tracks of the General Electric Company at Erie, Pa., before shipment to the Great Northern Railway. Four of these locomotives, practically duplicates of the four General Electric units that are now in operation on the Cascade Tunnel electrification in the state of Washington, are being shipped to the railroad.

to the Fishkill Electric Railway, Beacon.

American Car & Foundry Motors Company delivered five 40-passenger units to Boston Elevated Railway, six 23-passenger street car type coaches to the Aurora, Elgin & Fox River Railway, Aurora, Ill., and four 21-passenger parlor type coaches to the Fort Dodge, Des Moines & Southern Transportation Company, Boone, Iowa. Illinois Power & Light Corporation received three 33-passenger street car type coaches.

Boston, Worcester & New York Street Railway, Framingham, Mass., has accepted a White Model 54A bus and four White Model 54 buses. Other White deliveries include six Model 54 buses to West Penn Electric Company; one 54A bus to Washington Motor Coach Company, of Seattle; one Model 54 bus to United Electric Railways, of Providence, and one of similar type to the Los Angeles Railway.

◆

G. E. Employees Favor Unemployment Insurance

More than 75 per cent of the eligible employees of the General Electric Company have voted to participate in the new General Electric Employees unemployment plan. In proposing this plan, under which the money will be raised by equal contributions from the employees and the company, it was stated that the plan would become effective upon an affirmative vote of 60 per cent of those eligible at each works.

◆

Westinghouse Equipments for Detroit

The Westinghouse Electric & Manufacturing Company has received an order from the St. Louis Car Company for 65 car equipments to be placed in service in Detroit in the early fall. Forty-five of these are duplicates of similar equipment now operating in Detroit and twenty will be equipped with the Timken Model 52 truck.

◆

Electrical Manufacturers to Exchange Technical Information

The English Electric Company announces that it has entered into an arrangement with the Westinghouse International Company and the Westinghouse Electric & Manufacturing Company whereby there will be an exchange of technical information on steam turbines and electrical apparatus. The arrangement includes the granting of licenses for the use of patents for the manufacture and sale of various products.

This arrangement gives the English Electric Company the benefit of the results of the extensive research work carried on by the Westinghouse Electric & Manufacturing Company. The technical and manufacturing link does not carry with it any control from America.

◆

Ohmer Business Is Good

Some of the more important business received by Ohmer Fare Register Company, Dayton, Ohio, include: Sales of 146 fare registers to the Des Moines Railway and 105 fare registers to an Eastern transportation company.

New long term rental contracts have been closed with the Alabama Power Company for 37 fare registers; with the Northern Indiana Railway for 29 ticket-printing registers; with the East Penn Traction Company for 26 fare registers; with Atlantic City & Shore Railroad for 20 fare registers; with Lehigh Valley Transportation Company for 24 ticket-printing registers.

Yellow Truck Reports Good Half Year

Report of Yellow Truck & Coach Manufacturing Company, for the six months ended June 30, 1930, shows consolidated net profit of $1,437,863 after expenses and depreciation.

Consolidated income account for six months ending June 30, 1930, shows net sales of $26,963,994 as compared with net sales of $28,671,459 and $24,893,447 for the corresponding periods of 1929 and 1928, respectively. Net sales for the quarter ending June 30, 1930, were $16,233,998 as compared with $15,749,460 for the same quarter of 1929.

Paul W. Seiler, president, says: "The marked improvement in earnings during the second quarter over the first quarter reflects in large measure the influence of orders received during the first quarter. Production on these orders was well under way by the end of the first quarter, but actual deliveries were not made until the second period."

◆

Bulletin on Electric Railway and Motor Coach Lighting

A new lighting bulletin, E-109 "Lighting Practice for Electric Railways and Motor Coaches" issued by the Westinghouse Lamp Company, contains Sections E 121-29, E 122-28, and E 123-29 of the A.E.R.E.A. Engineering Manual, reprinted by permission of the American Electric Railway Engineering Association.

Recommendations for motor coach and railway car lighting are presented in two sections, each dealing with general principles; lamps for interior and exterior lighting; fixtures and reflectors for interior lighting; head lights; accessory lighting; signal lights; illuminated signs; lighting loads; lighting plans; and wiring diagrams.

A third section contains recommendations for shop, office, and yard lighting with divisions on lamps; reflecting accessories; lighting intensities; foot candle intensities; shop lighting; car inspection pits; office lighting; yard lighting; distributed lighting; and floodlighting.

All recommendations embodied in this bulletin were compiled by A.E.R.E.A Rolling Stock Committee No. 4—Lighting, of which R. W. Cost, Westinghouse Lamp Company is chairman.

◆

New General Electric Catalog

General Electric catalog GEA-600A, superseding all previous catalogs issued by the company, with the exception of those dealing with railway, mine and industrial supplies and merchandise products, has been issued. The book contains 1,146 pages, 8x10½ in., and is profusely illustrated.

The catalog is thumb-indexed in sixteen sections as follows: Generation, wire and cable, distribution transformers, arresters and capacitors, voltage regulators, switching equipment, switchgear, meters and instruments, lighting equipment, motors, motor applications, industrial control, transportation, industrial heating, miscellaneous, and indexes. In the indexes, products are classified both by subjects and by catalog numbers.

Electric Railway Material Prices—August, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	11.00
Lead, cents per lb.	5.25
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.10
Tin, Straits, cents per lb.	30.125
Aluminum, 98 to 99 per cent, cents per lb.	23.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	36.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.15
Somerset mine run, f.o.b. mines, net ton	1.75
Pittsburgh mine run, Pittsburgh, net ton	1.45
Franklin, Ill., screenings, f.o.b. mines	1.70
Central, Ill., screenings, f.o.b. mines	1.15
Kansas screenings, Kansas City	1.85

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive 9/16 in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.075
Angles bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.70
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.15
Sheet iron (24 gage), cents per lb.	2.50
Sheet iron, galvanized (24 gage), cents per lb.	3.20
Galvanized barbed wire, cents per lb.	2.85
Galvanized wire, ordinary, cents per lb.	2.80

Waste—New York

Waste, wool, cents per lb.	10.00 to 15.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	9.00 to 12.00
Colored	6.00 to 10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.4
White lead in oil (100 lb. keg), cents per lb.	13.75
Turpentine (bbl. lots), per gal.	0.47
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	12.75
Rubber-covered wire, No. 14, per 1,000 ft.	$5.05
Weatherproof wire base, cents per lb.	14.00

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.50
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	8.75
Light copper, cents per lb.	7.75
Heavy yellow brass, cents per lb.	5.25
Zinc, old scrap, cents per lb.	2.25
Lead, cents per lb. (heavy)	4.00
Steel car axles, Chicago, net ton	$15.25
Cast iron car wheels, Chicago, gross ton	13.75
Rails (short), Chicago, gross ton	14.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	6.25

Peacock Staffless Brakes

Light weight

Maximum power (3000 LBS.) breaking point

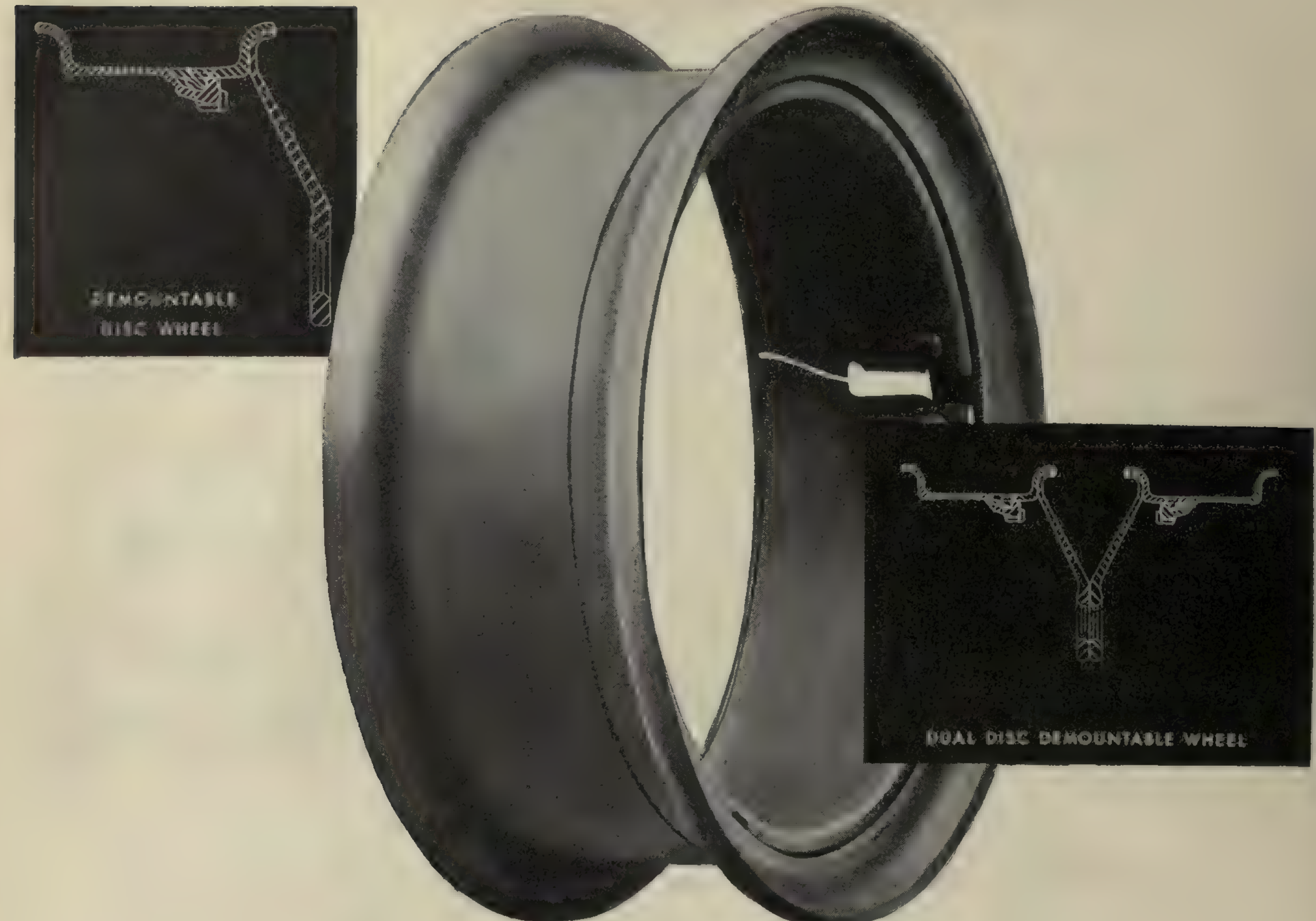
Never clog with chain

Lowest maintenance and long life

NATIONAL BRAKE COMPANY

890 Ellicott Square Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.
The Ellcon Co., *General Sales Representative:* 50 Church St., New York



For the greater efficiency of your fleet—

STANDARDIZE ON K RIMS

With Disc Type Wheels

Always safe on the road — locked rim assembly. Tire changes easily and quickly made. Available in all sizes. Standard equipment on many of the largest fleets throughout the country. Equip your fleet now. Specify K rims on new orders.

GOODYEAR

K RIM EQUIPMENT FOR TRUCKS AND BUSES

THE GREYHOUND LINES spread their network of coach operations through practically every state in the Union and, on the wheels of Greyhounds, Goodyear Bus Balloons travel more than four hundred million tire miles per year. New York to Chicago in 36 hours. New York to Denver in 65 hours. "Leave Indianapolis 3:30—arrive Cincinnati 8:45." That is the time table scheduling of Greyhound lines. Coaches must be on time. Connections must be met. Day, night, rain, shine, winter, summer, passengers must ride in comfort and safety—and at attractively low fares. Goodyear Bus Balloons play a tremendous part in such operations. They stand up under the heat generated by rapid travel. Their stamina enables Greyhound Lines to use roomier, all-steel coaches. They add to the comfort of passengers and by the same cushioning bring down maintenance costs. Their powerful All-Weather Tread holds the road with sure-footed, tight-gripping safety on hill and curve and rain-swept pavement. Serious delays due to tire trouble are now practically unknown. Here is performance that sets you thinking. Whether you carry passengers, or haul pay load in trucks, Goodyear Bus and Truck Balloon Tires offer you advantages too great to overlook . . . why not find out exactly what these new tires can do for you?

GOODYEAR

THE GREATEST NAME IN RUBBER

. . . *make every fare* COUNT!

by providing a ticket or transfer to meet every possible emergency.

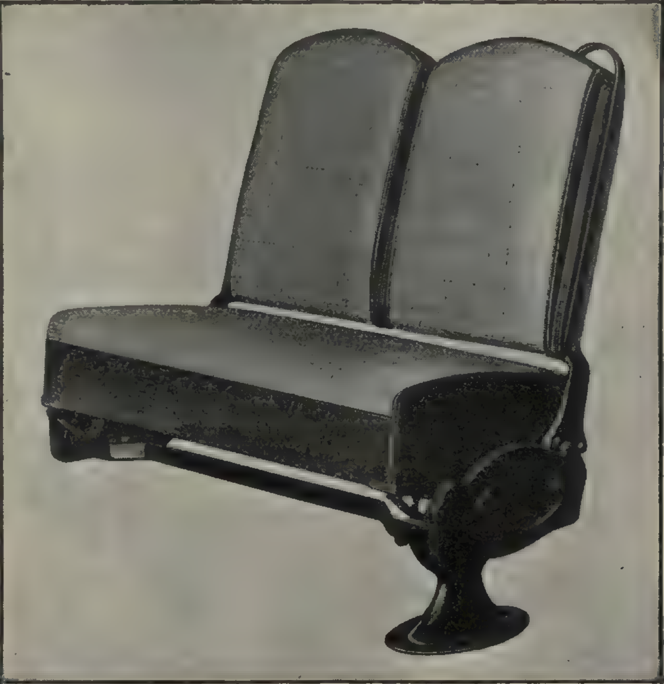
Let Globe help you! Our experience with practically every Electric Railway throughout the country, many of whom are confronted with intricate fare problems, should aid materially in solving your revenue difficulties.

Write Philadelphia or our nearest Branch Manager who is trained in transportation affairs and will gladly show you how we have helped others.

Globe
TICKET COMPANY
Philadelphia

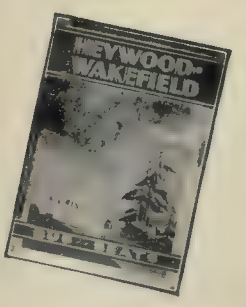
Factories:
Philadelphia
Boston
New York
Los Angeles
Atlanta

Sales Offices:
Baltimore
Cincinnati
Cleveland
Pittsburgh
Albany



A Comfortable, Sanitary and Modern Seat!

HERE is a seat which maintenance engineers will appreciate. Its close-woven cane webbing back and cushion are easy to keep clean. The genuine leather facing on the cushion reinforces the seat at the greatest point of wear. In addition, the individual backs and deep, spring cushions are shaped to allow proper posture and leg freedom. Mechanism rails are set in and the frame of the chair is made of selected Northern hard-grained ash, further strengthened by malleable iron braces. Write to the nearest Heywood-Wakefield sales office for complete details of the 327-M Special and other popular bus and electric railway seats in our line.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.

439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

THE Texas Company's introduction of low viscosity oils and the entirely new Texaco system of car-journal lubrication has revolutionized lubricating practices in the electric railway industry.

Although it is little more than a year since the first public announcement of this startling development, Texaco Lovis Oil and Texaco Oil Seals are now in use, or are being thoroughly tested out, on many of the important lines of the country.

A number of the electric railways are lubricated entirely under the new Texaco System.

Lubrication problems have been greatly simplified. Journal and bearing maintenance, waste consumption, power and labor costs have been radically reduced. Lubrication costs are actually lower in spite of the higher first cost of the lubricant.

Every electric railway executive should familiarize himself with what is being done. Valuable operating data are now available. Write The Texas Company for full details.

TEXACO

TEXACO LUBRICANTS

THE TEXAS COMPANY
135 East 42nd Street, New York City

Achieving Softness with Strength in Upholstery Leather

PUBLIC UTILITIES CHROME

* * * * * * * *

A genuine leather seat upholstery developed by Blanchard Bros. & Lane is now being supplied to Public Service Coordinated Transport of New Jersey.

This is the largest bus operating company in the country whose very size makes it necessary to have intimate knowledge of the modern quality and character of each material required where the maximum comfort, durability and smart appearance are paramount.

Practically all upper shoe leather is Full Chrome tanned which after many years has proven to be the strongest and toughest leather made. Public Utilities Chrome upholstery leather has been developed along the same principle and the maximum of strength, durability and softness has been exemplified to the great fraternity of discreet buyers.

* * * * * * * *

We Also Offer

OAK TANNED LEATHER

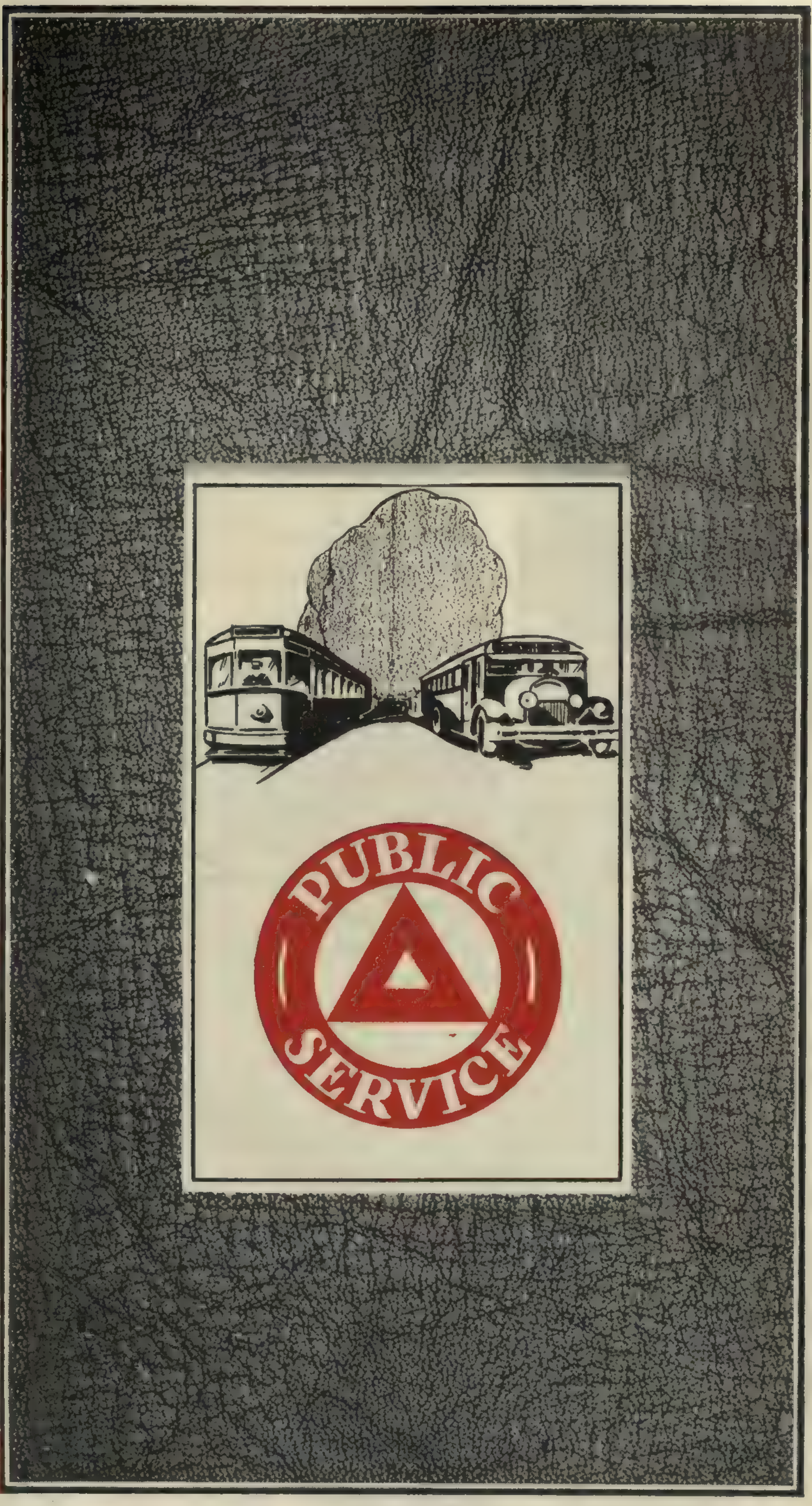
for seat upholstery—a product we have been making for seventy years, constantly taking advantage of modern chemical engineering.

Again we have studied comparative tanning agent values and the achievements of manufacturers of sole leather for shoes. We find that with certain refinements, oak bark offers the best in vegetable tanning for seat upholstery just as it does for the soles of shoes and transmission belting.

Firm, with strong texture, it is still soft and mellow retaining its shape in service. Its freeness from bagging so common to other and cheaper vegetable tannages is its greatest asset. Like the sturdy oak, Buffalo Brand has stood the test of time as it is truly a product of merit in transportation service.

* * * * * * * *

City of Detroit—Dept. of Street Railways are using Buffalo Brand full grain oak tanned leather (S. A. E. specifications) on the seats of the 130 new cars being built by the St. Louis Car Company.



Established 1860

BLANCHARD BRO. & LANE

Tanners and Finishers

NEWARK, N. J.

Sales Representatives

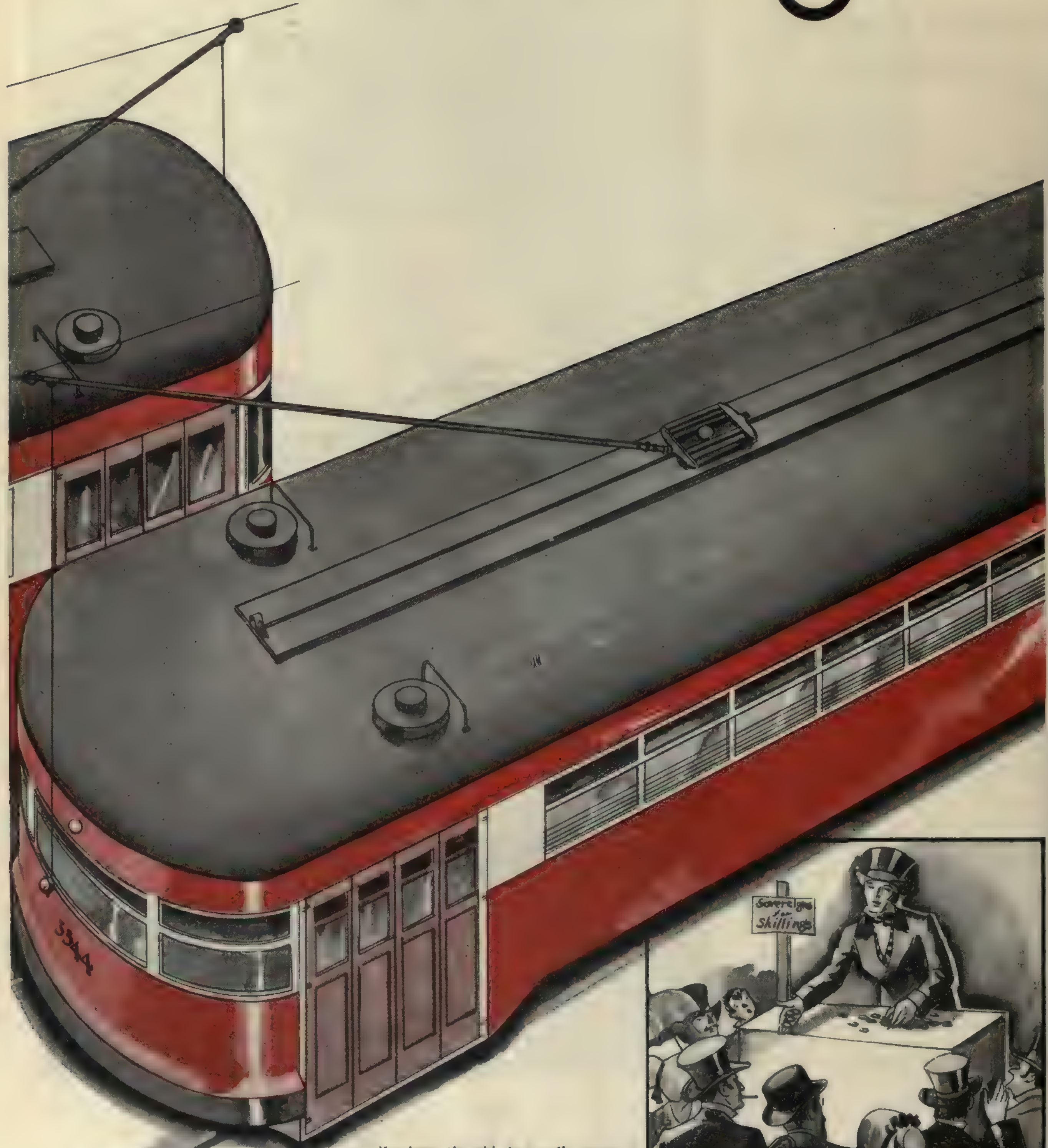
C. S. Withrow
Connersville, Indiana

Ryan Sales Engineering Co.
82 Lathrop Ave., Detroit, Mich.

W. M. Lalor Co.
LaSalle and Wacker Drive, Chicago, Ill.

Geo. Faustmann
1020 Chestnut St., Philadelphia, Pa.

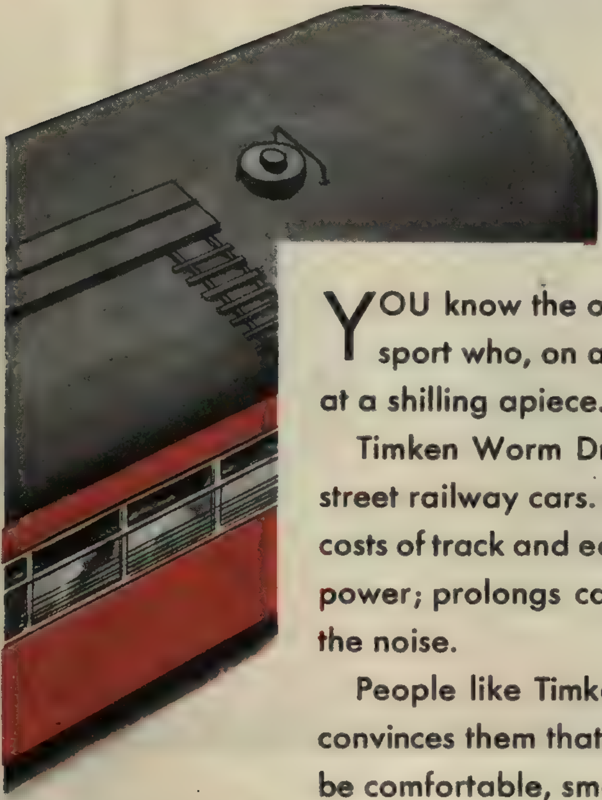
"Sovereigns



You know the old story — the young London sport who, on a bet, offered gold sovereigns at a shilling apiece. There were no buyers.

THE TIMKEN DETROIT

. . . . a shilling apiece"



YOU know the old story — the young London sport who, on a bet, offered gold sovereigns at a shilling apiece. There were no buyers.

Timken Worm Drive is logical equipment for street railway cars. It cuts down weight; reduces costs of track and equipment maintenance; saves power; prolongs car life; and eliminates most of the noise.

People like Timken equipped cars. One ride convinces them that street car transportation can be comfortable, smooth, quiet.

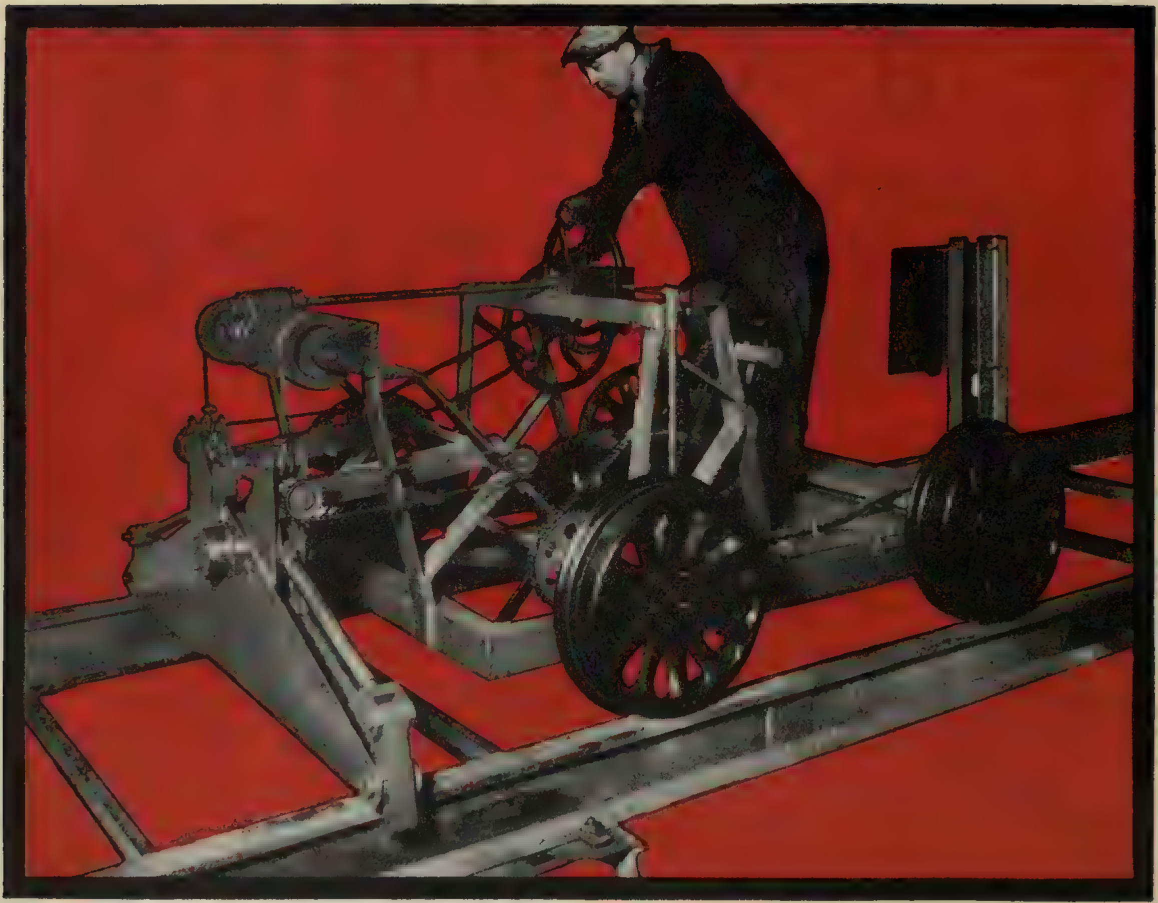
Go back to first principles. Bite one of the sovereigns. If it is gold, pay a shilling for it—quick!

TIMKEN
worm drive
TRUCKS

for electric railway cars

DTA CO

AXLE CO., DETROIT, MICH.



For Low Cost and Long Life in Paved Track "Mix" Your Steel With the Concrete!

The 7200 vibrations per minute produced by the "Mortar-Flow" Pulsator, when clamped to the track structure as concrete is being placed, are transmitted to all adjacent concrete thus causing it to flow and settle into perfect contact with all the steel of rails and ties.

The flowing action completely fills all voids with cement paste, which bonds to the steel so tightly that it is difficult to remove even when still soft; and, after setting, produces a bond twice as strong as do hand methods.

This combined flow to fill voids and bonding action completely and permanently seals the structure and, in effect, "mixes" the steel of rail and ties with the concrete as effectively as the aggregate is mixed with and covered by cement paste in the drum of a concrete mixer.

In brief, these important benefits to paved track, where concrete is used either in paving, paving support or as foundation, are:

1. ***All voids filled and we don't mean perhaps.***
2. ***Strength of bond between concrete and steel increased two to three times.***
3. ***The most perfect seal against water entering the structure is provided in this tight concrete-steel bond.***
4. ***A denser and more waterproof concrete is produced.***
5. ***Excess water is brought to the top of the slab which corrects overwet mixes and increases the strength of concrete.***
6. ***Labor cost for leveling and tamping is reduced.***
7. ***Maximum results are obtained with Steel Twin Ties in concrete base, but the method and machines are available for all types of paved track construction.***

Investigate today—quick shipment—reasonable rental charge—low initial track costs.

THE INTERNATIONAL STEEL TIE CO., Cleveland, Ohio

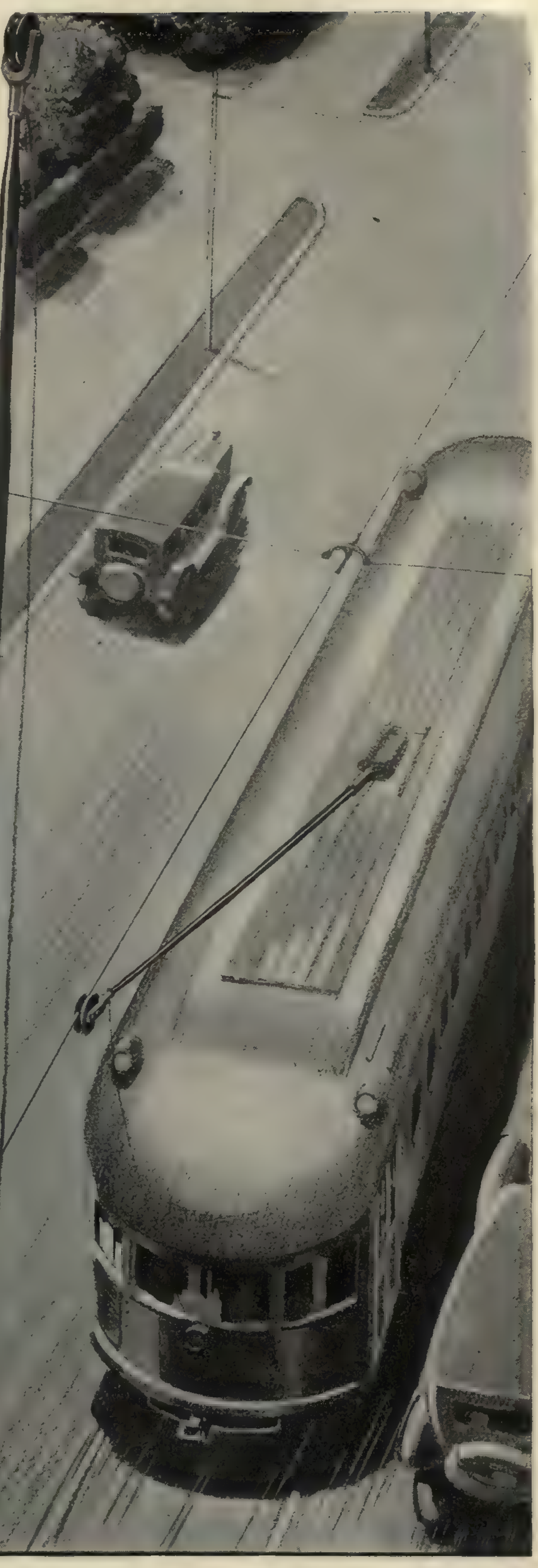
There are also fewer delays with Trolley Poles that are Built to Live Long and Travel Far

REGULARITY and efficiency in electric railway service are measured increasingly, today, by the ability of trolley poles to "stay put"—with few repairs or replacements.

To minimize the possibility of any defective pole being installed, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. Long life and satisfactory service are assured by the use of a selected grade of steel, which is given special heat treatment prior to the last drawing operation.

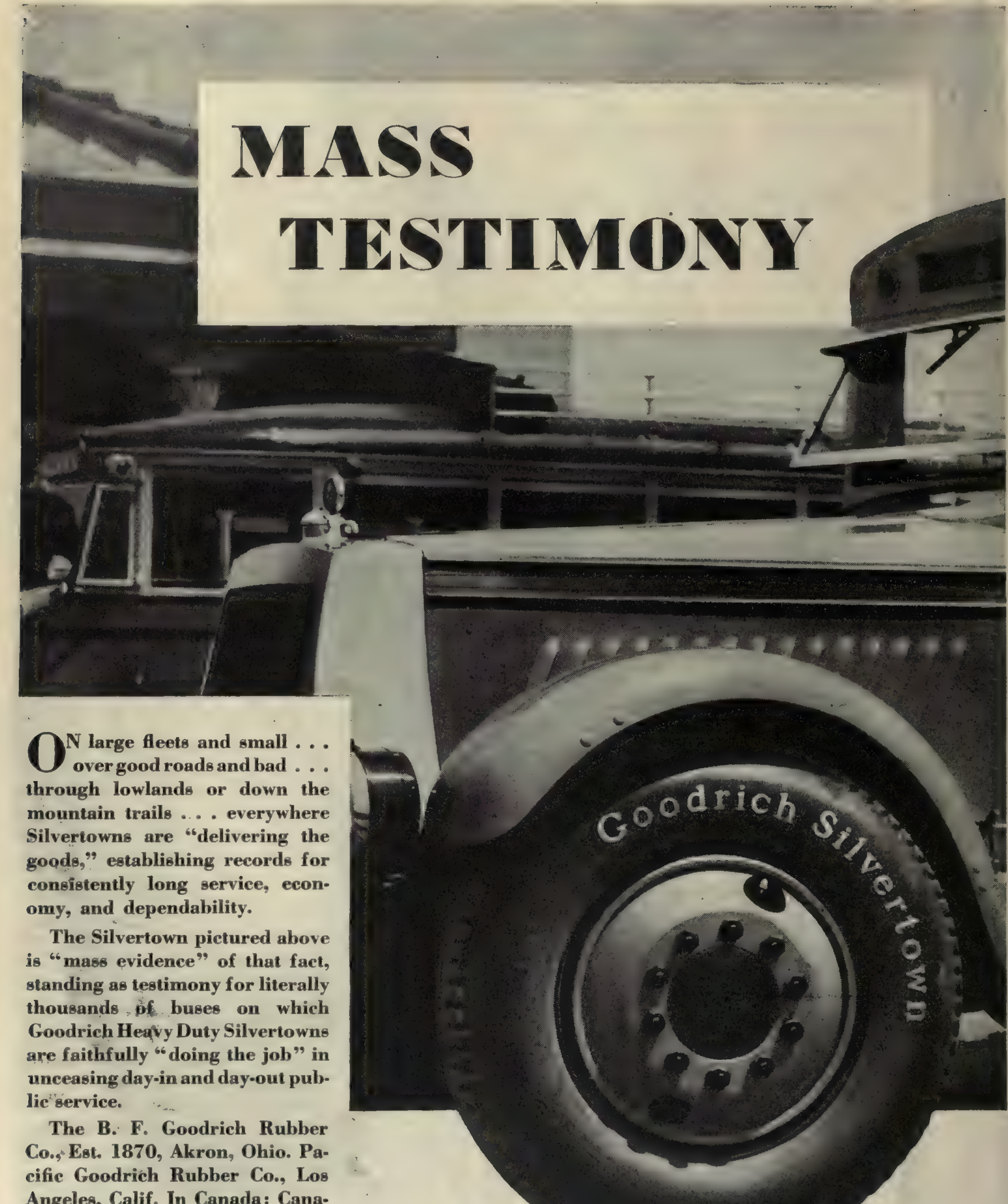
NATIONAL-SHELBY Poles have a special reinforcement integral with the body of the pole and so placed as to add great strength without excess weight. Write for complete information.

NATIONAL TUBE COMPANY
Subsidiary of United States Steel Corporation
PITTSBURGH, PA.



NATIONAL *SHELBY SEAMLESS* POLES

MASS TESTIMONY



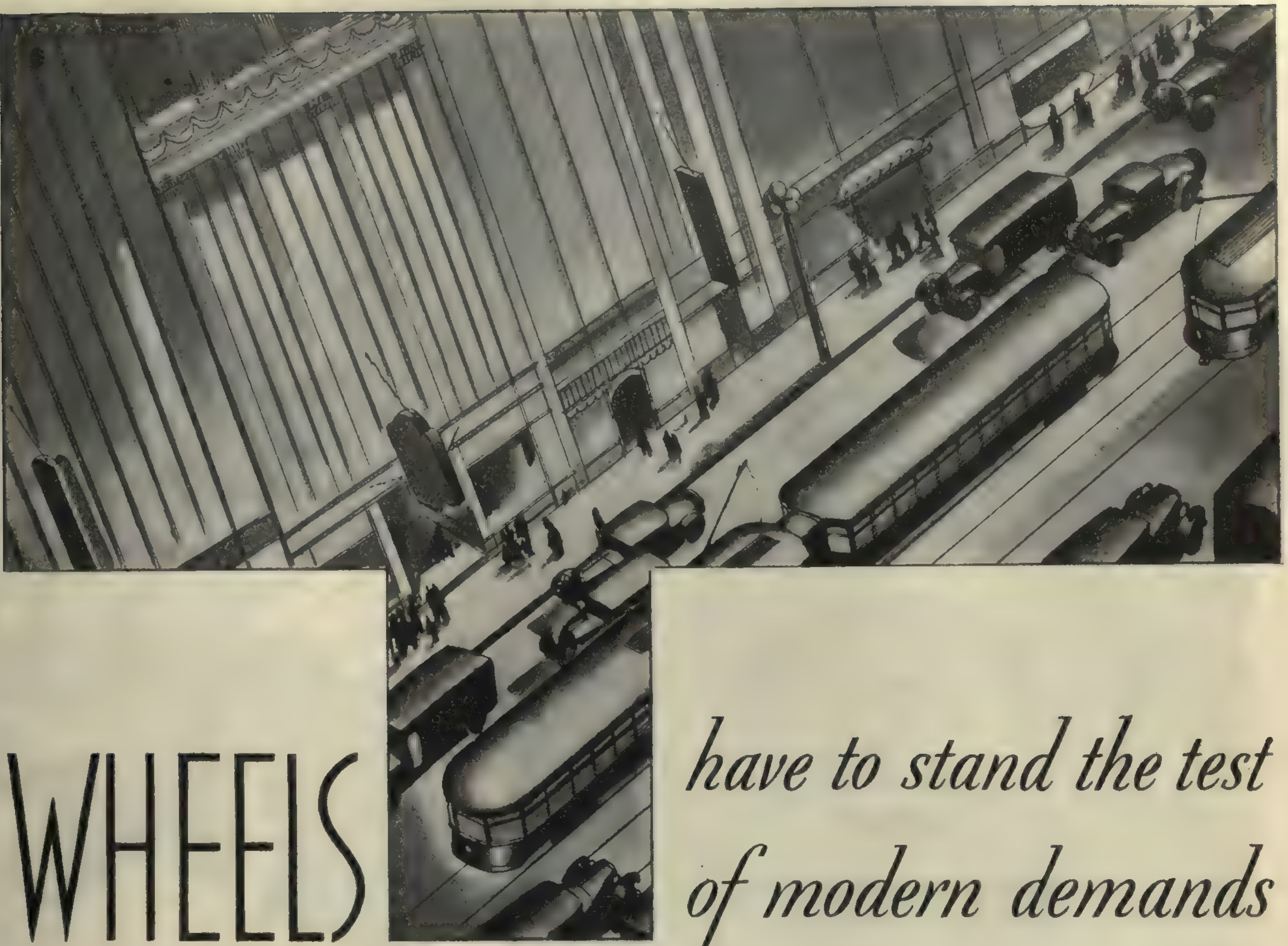
ON large fleets and small . . . over good roads and bad . . . through lowlands or down the mountain trails . . . everywhere Silvertowns are "delivering the goods," establishing records for consistently long service, economy, and dependability.

The Silvertown pictured above is "mass evidence" of that fact, standing as testimony for literally thousands of buses on which Goodrich Heavy Duty Silvertowns are faithfully "doing the job" in unceasing day-in and day-out public service.

The B. F. Goodrich Rubber Co., Est. 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ont.

Goodrich HEAVY DUTY **Silvertowns**

SPECIFY GOODRICH ON YOUR NEW BUSES



WHEELS *have to stand the test of modern demands*

TRAFFIC conditions today—peak loads, rapid acceleration, emergency stopping—all these throw a tremendous burden on equipment, particularly the wheels.

Carnegie Wrought Steel Wheels are built to withstand the stress of modern traffic. Wrought Steel is obtained through rolling and forging. A 10,000 ton hydraulic press (twenty million pounds!) refines the steel—insures a homogeneous structure, free from irregularities that might cause trouble. A rolling process further refines and toughens the wearing surfaces. The result is a wheel of exceptional endurance—of exceptional safety. A wheel fit for any service.

•

Before you invest in new wheels, investigate the many advantages of Wrought Steel. Literature on request.

CARNEGIE STEEL COMPANY • PITTSBURGH, PA.
Subsidiary of United States Steel Corporation 83

CARNEGIE
WROUGHT STEEL WHEELS

.....and their continued use of Cities Service products tells its own story of complete satisfaction

Northwestern Motorbus Company piled up a total of nearly a million miles in 1929. The Company's fleet of 31 buses and trucks used Koolmotor and Cities Service Gasolene, and Koolmotor Bus Oils and Cities Service Greases, exclusively throughout the year.

Northwestern's *continued* dependence on Cities Service products in 1930 tells its own story of complete satisfaction in hard, every-day service.

Users are bound to like Cities Service products because they have undergone the most conclusive of all tests—the test of actual service—in Cities Service's own fleet of more than 4000 motor vehicles.

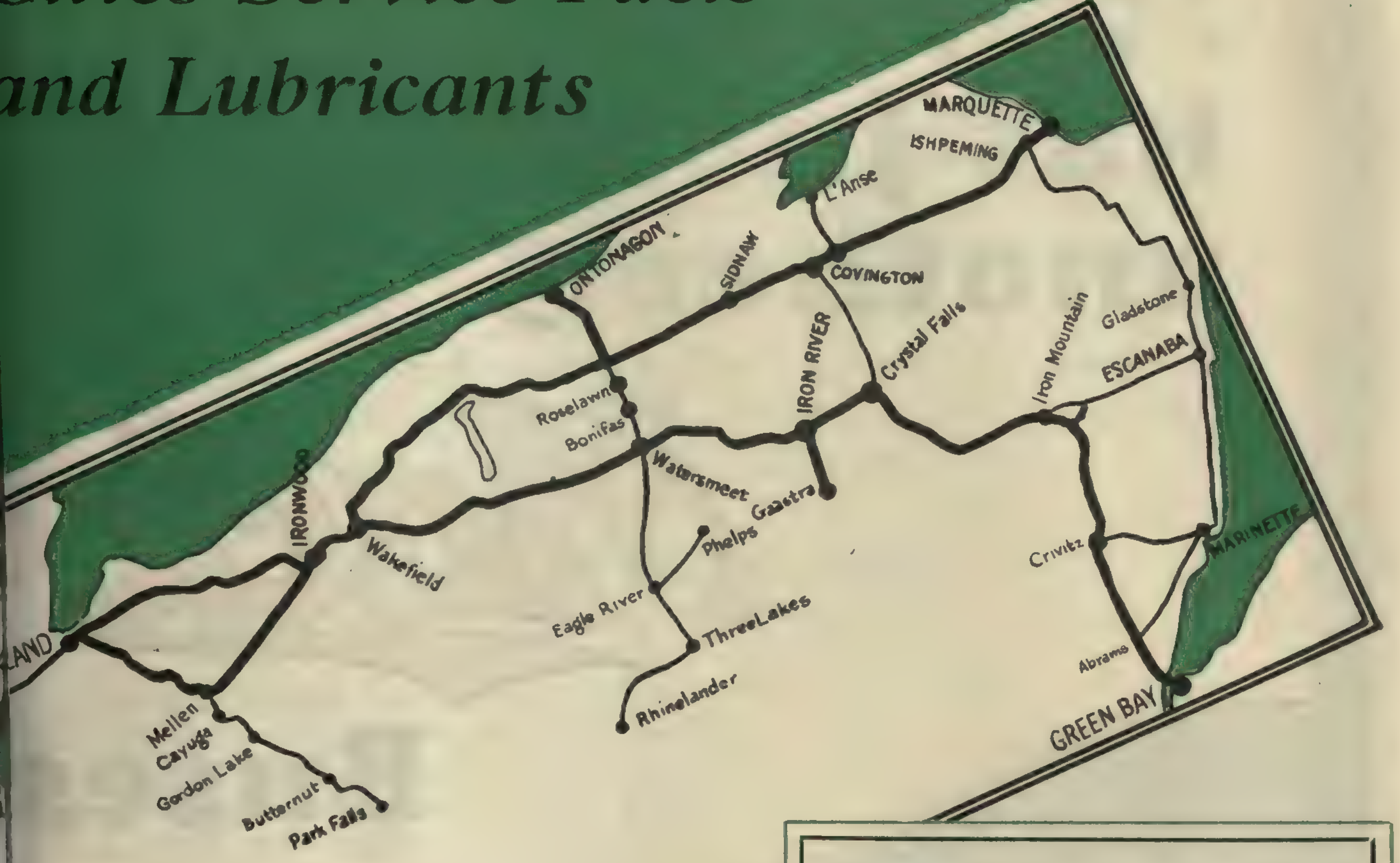
Cities Service engineers have solved the fuel and lubrication problems of Cities Service transportation fleets. They will gladly study *your* problems and recommend the scientifically correct lubricants and fuels for your equipment.

CITIES SERVICE COMPANY

60 WALL STREET NEW YORK CITY

KOOLMOTOR PRODUCTS

ran 930,750 miles in 1929—on
Cities Service Fuels
and Lubricants



Company: Northwestern Motor Bus Co., Bessemer, Mich.

Number of Vehicles: 17 Buses and 14 Trucks

Average Daily Mileage: 2550

Passengers Carried in 1929: 352,286

Cities Service Products Used:
- Koolmotor Oils
- Koolmotor Gasolene
- Cities Service Gasolene
- Cities Service Greases

. . . . . so Seattle has just bought another 5

Mack

Buses

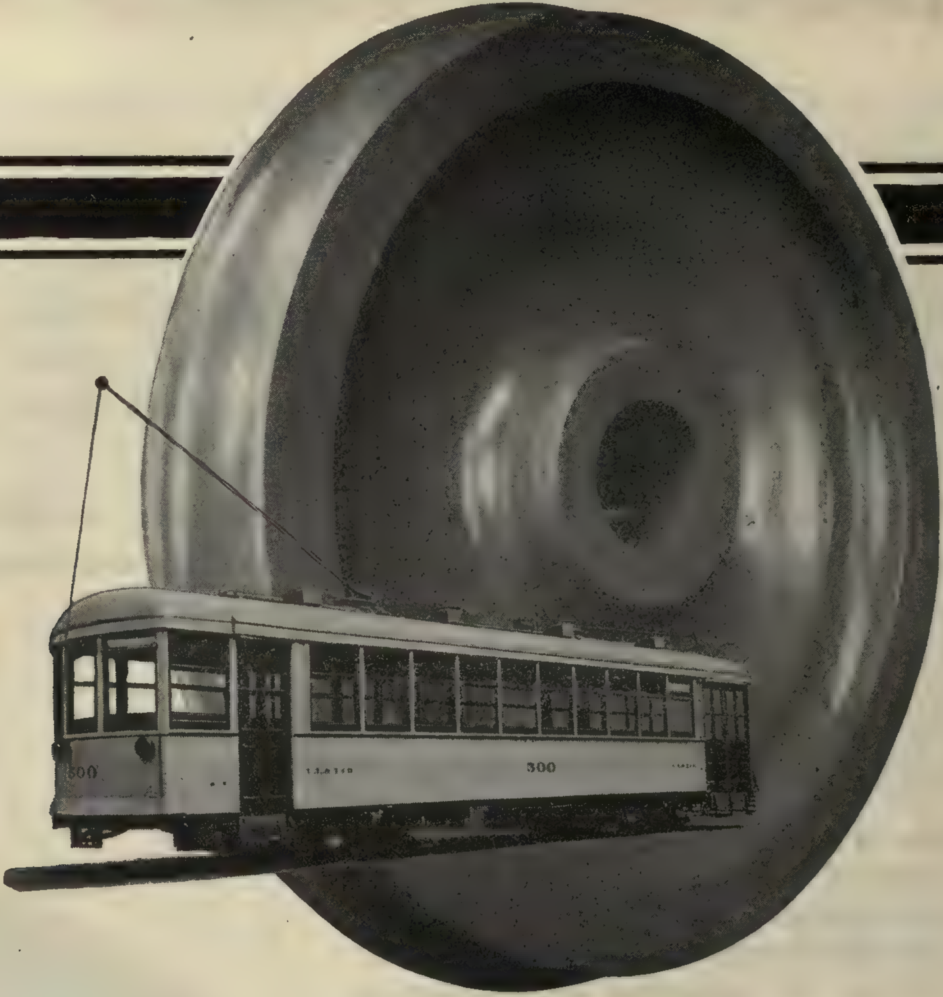
In May, 1929, the Seattle Municipal Railway purchased five Mack Model AB 4-cylinder Buses to operate on feeder lines.

So successful were these buses, so well did they meet conditions, so low was the average operating cost that —five Mack Model BC 6-cylinder Buses (33 passengers) have just been delivered to Seattle, the first of this new type to be sold on the Pacific Coast.

Such repeat orders are incontrovertible evidence of passenger satisfaction, maximum bus revenue and low maintenance and operating figures.

MACK TRUCKS, INC.
25 Broadway, New York

Electric Railway Companies thruout the country also use Mack Trucks for tower wagons, for wreckers, for pick-up and delivery service, for sand spreaders, for general maintenance work of every kind, because their use saves money.



—PRODUCTS—

Wrought Steel Wheels

Armature Shafts

Springs and Axles

What is it that you desire in wheels?

Safety—
Elimination of broken flanges and flats—
Increased mileage—
Low maintenance costs—

"Standard" Wrought Steel Wheels will meet these requirements.

STANDARD STEEL WORKS COMPANY

General Offices and Works: Burnham, Penna.

Sales Offices:

New York
Chicago
Richmond
St. Louis
Philadelphia
San Francisco
Portland

Here is how Cheaply you can now Telephone to other Cities

Your customers are no further away than the telephone on your desk

THIS CHART SHOWS THE STATION-TO-STATION DAY RATES BETWEEN REPRESENTATIVE CITIES

	Atlanta, Ga.	Boston, Mass.	Chicago, Ill.	Cincinnati, Ohio	Cleveland, Ohio	Denver, Colo.	Detroit, Mich.	Indianapolis, Ind.	Milwaukee, Wis.	Newark, N. J.	New Haven, Conn.	New York, N. Y.	Omaha, Neb.	Philadelphia, Pa.	San Francisco, Cal.	St. Louis, Mo.	Washington, D.C.
Atlanta, Ga.		3.50	2.35	1.65	2.15	4.50	2.35	1.75	2.55	2.75	3.25	3.00	3.00	2.55	7.75	1.95	2.35
Boston, Mass.	3.50		3.25	3.00	2.35	6.50	2.55	3.00	3.25	1.05	.70	1.00	4.50	1.25	9.50	3.75	1.65
Chicago, Ill.	2.35	3.25		1.20	1.45	3.50	1.15	.90	.50	2.75	3.00	3.00	1.80	2.55	6.75	1.25	2.55
Cincinnati, Ohio	1.65	3.00	1.20		1.25	4.00	1.15	.60	1.50	2.35	2.55	2.35	2.55	2.15	7.25	1.45	1.80
Cleveland, Ohio	2.15	2.35	1.45	1.25		4.50	.60	1.25	1.65	1.70	1.95	1.80	3.00	1.60	7.75	2.05	1.45
Denver, Colo.	4.50	6.50	3.50	4.00	4.50		4.25	3.75	3.50	6.00	6.25	6.00	2.05	5.75	3.75	3.25	5.50
Detroit, Mich.	2.35	2.55	1.15	1.15	.60	4.25		1.15	1.25	1.95	2.15	2.05	2.75	1.85	7.50	1.95	1.70
Indianapolis, Ind.	1.75	3.00	.90	.60	1.25	3.75	1.15		1.20	2.55	2.75	2.55	2.15	2.35	7.00	1.10	2.05
Milwaukee, Wis.	2.55	3.25	.50	1.50	1.65	3.50	1.25	1.20		3.00	3.00	3.00	1.75	2.75	6.75	1.50	2.55
Newark, N. J.	2.75	1.05	2.75	2.35	1.70	6.00	1.95	2.55	3.00		.50	.15	4.00	.50	9.00	3.25	1.00
New Haven, Conn.	3.25	.70	3.00	2.55	1.95	6.25	2.15	2.75	3.00	.50		.50	4.25	.80	9.25	3.50	1.30
New York, N. Y.	3.00	1.00	3.00	2.35	1.80	6.00	2.05	2.55	3.00	.15	.50		4.25	.50	9.00	3.25	1.05
Omaha, Neb.	3.00	4.50	1.80	2.55	3.00	2.05	2.75	2.15	1.75	4.00	4.25	4.25		4.00	5.25	1.65	3.75
Philadelphia, Pa.	2.55	1.25	2.55	2.15	1.60	5.75	1.85	2.35	2.75	.50	.80	.50	4.00		8.75	3.00	.75
San Francisco, Cal.	7.75	9.50	6.75	7.25	7.75	3.75	7.50	7.00	6.75	9.00	9.25	9.00	5.25	8.75		6.50	8.50
St. Louis, Mo.	1.95	3.75	1.25	1.45	2.05	3.25	1.95	1.10	1.50	3.25	3.50	3.25	1.65	3.00	6.50		2.75
Washington, D. C.	2.35	1.65	2.55	1.80	1.45	5.50	1.70	2.05	2.55	1.00	1.30	1.05	3.75	.75	8.50	2.75	

It is your business pathway to the world . . quick, convenient, inexpensive

THE TELEPHONE takes you "there and back" in minutes. You can transact business over thousands of miles without leaving your desk. "See" as many people as you wish. Give or receive a definite answer immediately . . . at a saving of time and money.

There are two kinds of out-of-town calls: *person-to-person*—when you ask the operator to summon a specific person to the telephone; and *station-to-station*—when you will talk with any one who answers. Station-to-station calls are cheaper. The charges can be reversed without additional cost on person-to-person calls and on many station-to-station calls.

Features of Bell Telephone service which are of particular aid in sales work include the *Key Town Plan*, for covering territories from key cities by telephone . . . *Sequence Calling Lists*, for putting through any number of calls in rapid succession . . . *Credit Cards*, which make it possible for traveling representatives to charge their telephone calls to the home office.

Doing business by telephone widens the sphere of your activities. There have been four reductions in inter-city telephone rates during the past four years. The average Long Distance call goes through in approximately two minutes. Bell Telephone service is *Quick . . . Convenient . . . Inexpensive.*

Youngstown Wins Coffin Award ...

Basin and Federal Streets, Youngstown, Ohio

Extra heavy main line traffic. One left hand branch off and four crossings.
Weight 134 pounds, 9 in. section.
Trilby Solid Manganese Frogs and Switches.
All on DAYTON TIE FOUNDATION.
Installation made under traffic.
Work started 12 o'clock noon on Saturday—completed, including concreting and paving at 5 P.M. Tuesday following.

THE DAYTON INTEGRAL SYSTEM OF

DAYTON TIES *used as standard!*

Congratulations, Youngstown, upon your record . . . congratulations also upon your selection of Dayton Ties as standard construction. We predict that present as well as future records for low maintenance will be amply safeguarded and increased with every mile of track where Dayton Ties are used . . . The wisdom of your selection is reflected in the fact that three out of five other properties submitting a record of their accomplishments during 1928 and who made noteworthy contributions to the development of the electric railway industry *also standardize on Dayton Ties.*

Dayton Ties being installed under traffic on the properties of the Youngstown Municipal Railway. The installation of Dayton Ties is so simple that the need of expensive and intricate machinery is eliminated and ordinary labor used with the assurance of *permanently satisfactory results.*

TO THE ELECTRIC RAILWAY INDUSTRY AT LARGE

—May we express our sincere belief that we have made our contribution to the successful and outstanding maintenance of way records at Youngstown and to many other properties where Dayton Ties are used.

The Dayton Mechanical Tie Company
Dayton, Ohio

TRACK AND PAVING STRUCTURE

CO-ORDINATION

NOWADAYS any income which can be relied upon has enhanced value. The income to the electric railway companies from the rental of space to Collier Service falls into this class. It is income which does not cost the electric railway company extra effort or expense to earn, and it is equivalent to many paid fares.

Collier Service, down thru the decades, has built a nation-wide organization of experts in the highly specialized field of car card advertising. No small part of its business is developing and maintaining a car card advertising service as an asset to the electric railway companies. And it is to the mutual interest of those concerned that this asset be sustained by co-ordinate effort.

BARRON G.
COLLIER INC.
CANDLER BLD'G
NEW YORK CITY

CAR CARD ADVERTISING ALMOST EVERYWHERE

NEW ORLEANS SELECTS

After careful consideration

CINCINNATI

ELECTRIC
TROLLEY
COACHES

NEW ORLEANS

CINCINNATI ELECTRIC

THE New Orleans Public Service, Inc., on part of a certain route, found it advisable—after *careful consideration*—to discontinue rail service.

The route comes into the center of the city and also taps a residential district. The question arose as to what type of equipment might best be employed to provide rider sales appeal, comfort and rapid transportation, combined with economical operation.

SOLVED A PROBLEM

After careful consideration with

TROLLEY COACHES

After *careful consideration,* 11 *Cincinnati Trolley Coaches* were ordered. Because—

> **Based on the experience of other cities with *Cincinnati Electric Trolley Coaches,* and because of improved design and construction with minimum weight, a lower cost per mile of operation was possible.**

AGAIN A STEP AHEAD OF THE MODERN TREND

After careful consideration

IN ELECTRIC TROLLEY COACH CONSTRUCTION

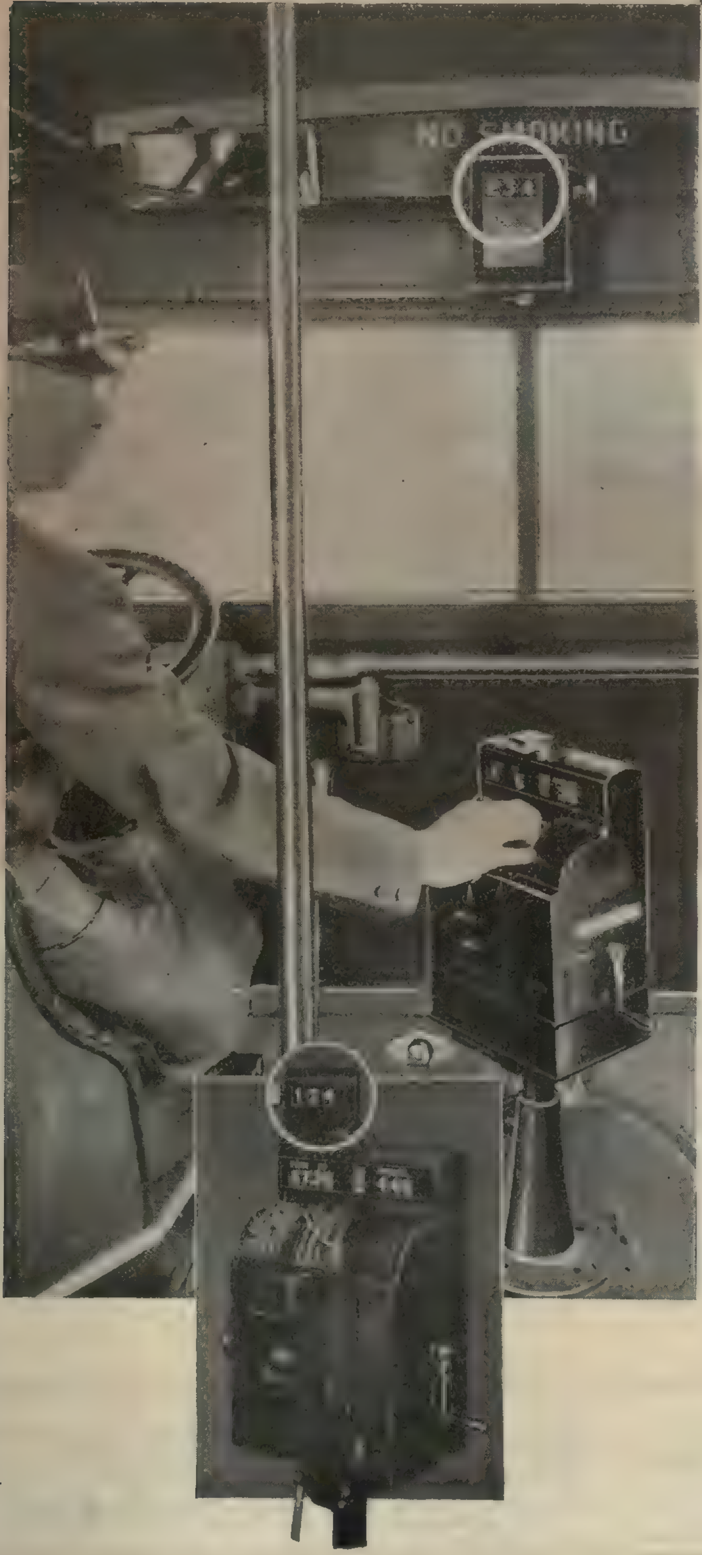
One of the *careful considerations* in the selection of Cincinnati Electric Trolley Coaches—with relation to assured economical operation—was an improved method of construction; particularly of interest to Electric Railway Operators, as conceived, designed and exclusively incorporated in the construction of Cincinnati Electric Trolley Coaches. What Cincinnati Care, Leadership and Experience made available for New Orleans, merits your *careful consideration.*

THE CINCINNATI CAR CORPORATION
Cincinnati, Ohio

O-15

For 31 years

an important and exclusive feature of OHMER Fare Registers has always been the *Passenger Counter,* which gives a *visible* record of number of registrations for checking purposes.



The Passenger Counter

is available also for the OHMER Model 80 Ticket-Printing Registers, either as a separate or integral attachment. With the Passenger Counter the OHMER "80" gives *complete* fare protection from every possible angle.

THE passenger counter is a time-honored device on all types of OHMER Fare Registers designed for overhead installations. This indicator enables an inspector located in any part of the vehicle to conduct an accurate "on and off" check. With the resetting of the indicator at the end of the line the direction indication changes, enabling a positive check to be obtained on traffic in either direction.

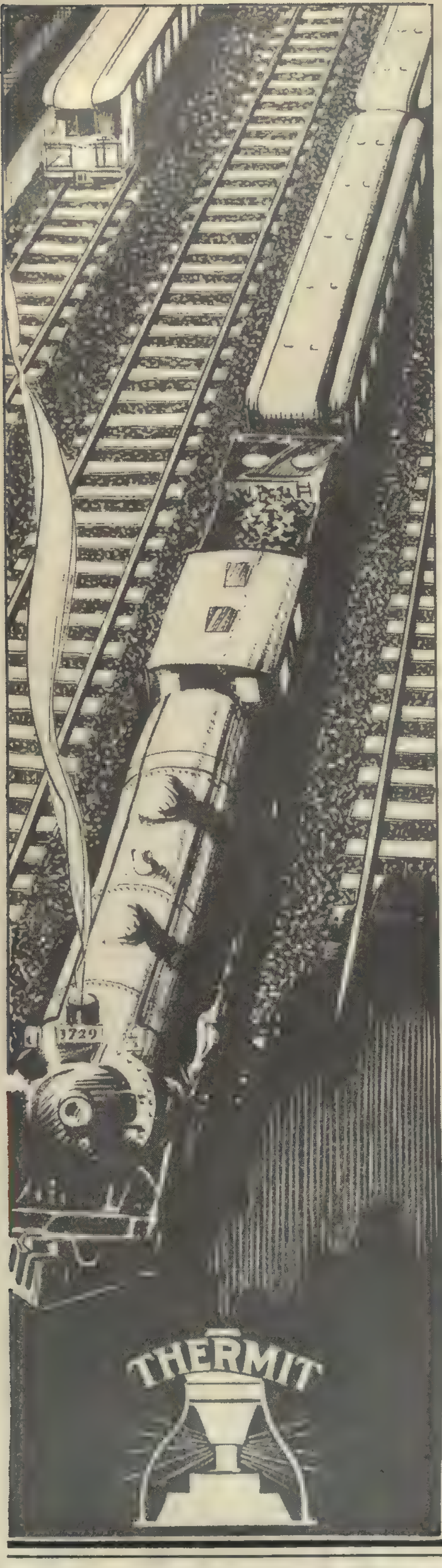
The passenger counter may be had as an attachment for the ticket-printing OHMER Model 80 in two forms. The larger illustration to the left shows it entirely separate from the register, placed overhead on the bulkhead of the car, operated automatically and simultaneously by electric connection with the operating bar of the register. Or the passenger counter can be furnished as an integral part of the register itself, adjustable to face in any direction so it can be readily checked from any part of the car, as illustrated in the insert to the left, below.

Affords Complete Protection

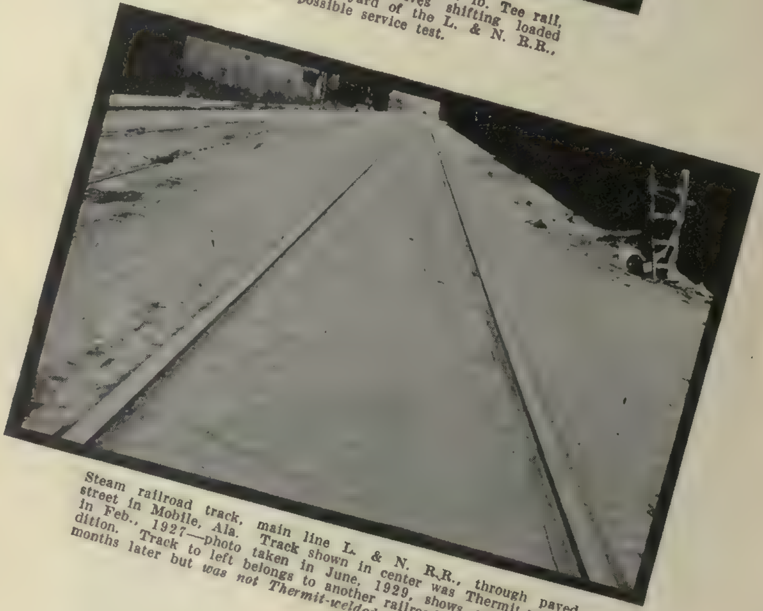
This combination Passenger Counter and latest improved OHMER Model 80 Ticket-Printing Register, with its printed detail strip, makes traffic checking thorough and effective. The Passenger Counter with its visible check enables the inspector to analyze passenger movements by zone or direction. And the printed detail strip of the OHMER "80" provides a complete analysis of every accounting detail of distance and fare paid.

Nothing less than *complete* protection is *satisfactory* protection. None but OHMER can give OHMER results. Our many years of experience are at your command.

OHMER
REG. U.S. PAT. OFF. AND OTHER COUNTRIES
FARE REGISTER COMPANY
DAYTON, OHIO, U. S. A.



Five joints, some of them compromise, 100 lb. to 90 lb. Tee rail, —Thermit-welded close to frogs. Locomotives shifting loaded freight cars constantly in the Mobile yard of the L. & N. R.R., give Thermit welds the severest possible service test.



Steam railroad track, main line L. & N. R.R., through paved street in Mobile, Ala. Track shown in center was Thermit-welded in Feb., 1927—photo taken in June, 1929, shows excellent condition. Track to left belongs to another railroad, was built a few months later but *was not Thermit-welded.*

THERMIT WELDS on Steam Railroad Tracks

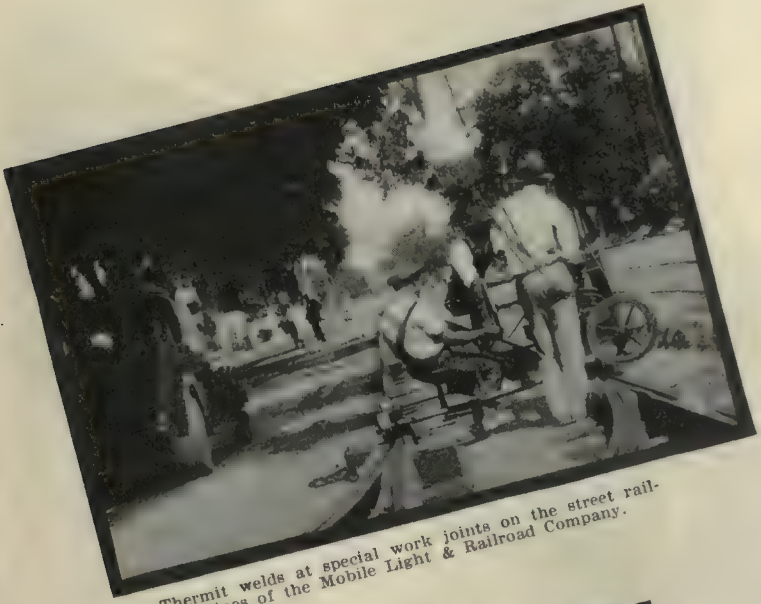
No better proof could be found of the ability of Thermit welding to stand up under heavy traffic, than its growing use on steam railroad lines. Where railroad trains run through paved streets, Thermit welding has been found to be a satisfactory solution of the rail joint problem. A typical example—the Louisville & Nashville R.R. Co.'s line through Mobile, is shown above. Over this track passes the Crescent Limited, New York to New Orleans, and thousands of tons of freight daily.

The world famous Twentieth Century Limited runs through the city of Syracuse, N. Y., over Thermit-welded joints.

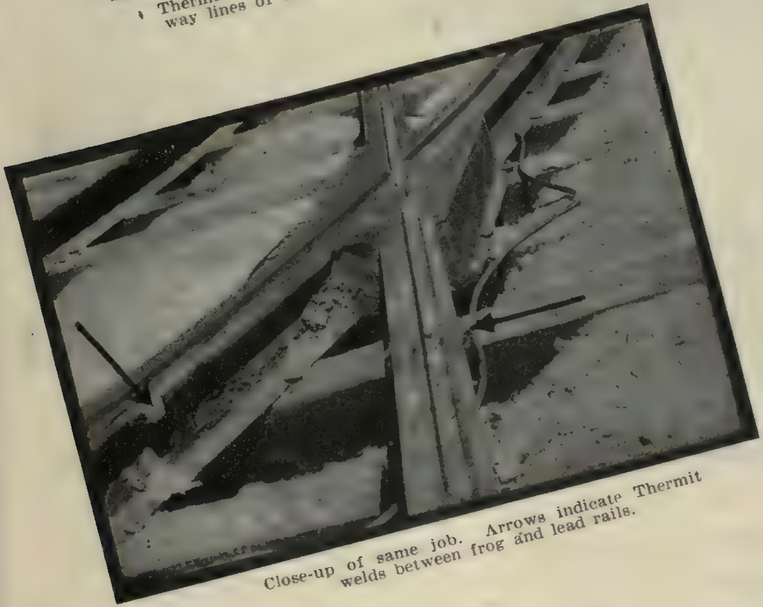
Steam railroads also are finding Thermit solves their troubles with compromise joints in yards and terminals.

METAL & THERMI

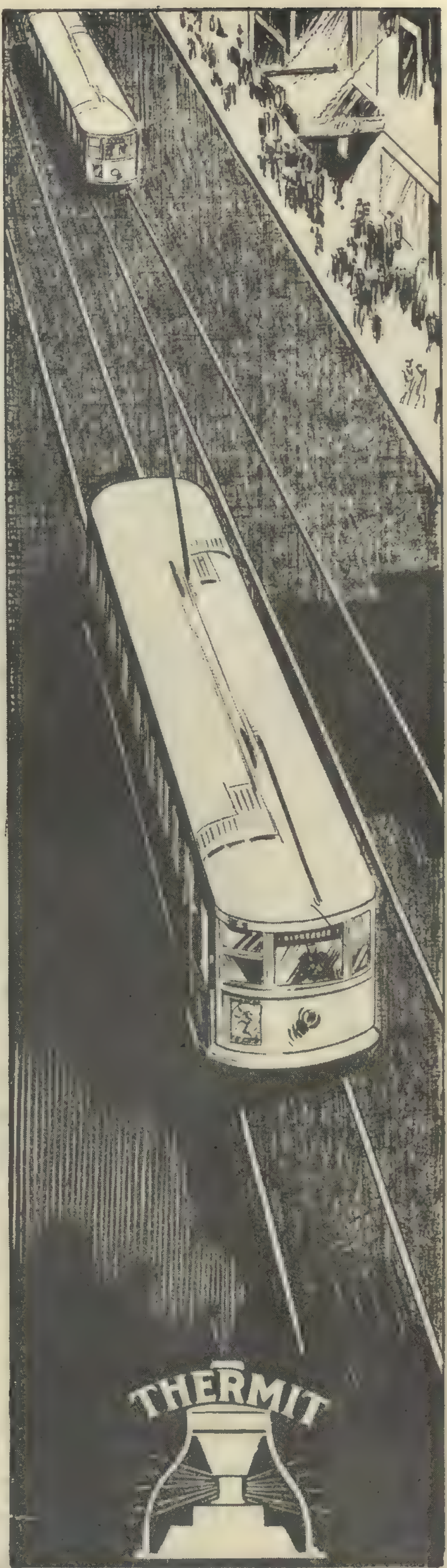
PITTSBURGH CHICAGO BOSTON 120 BROADWAY



Thermit welds at special work joints on the street railway lines of the Mobile Light & Railroad Company.



Close-up of same job. Arrows indicate Thermit welds between frog and lead rails.



THERMIT WELDS on Electric Railway Tracks

Thermit welding of electric railway track is by no means confined to companies in the largest cities. Many systems operating fifty to one hundred miles of track, are using more and more Thermit, as the advantages of initial installations become apparent. The Mobile Light & Railroad Company is a typical example.

Other users of Thermit are to be found in every part of the United States and Canada.

The process of Thermit welding is so developed that it presents no mechanical or labor difficulties even to the smaller roads. Any reasonably intelligent trackman can be trained to make perfect Thermit Welds. The necessary apparatus can be purchased on easy terms, or rented at very moderate cost.

CORPORATION

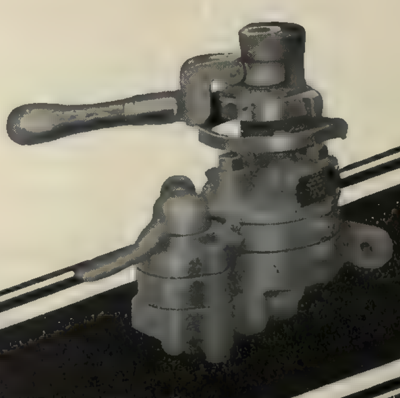
EW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO

The SAFETY CAR CONTROL EQUIPMENT . . .

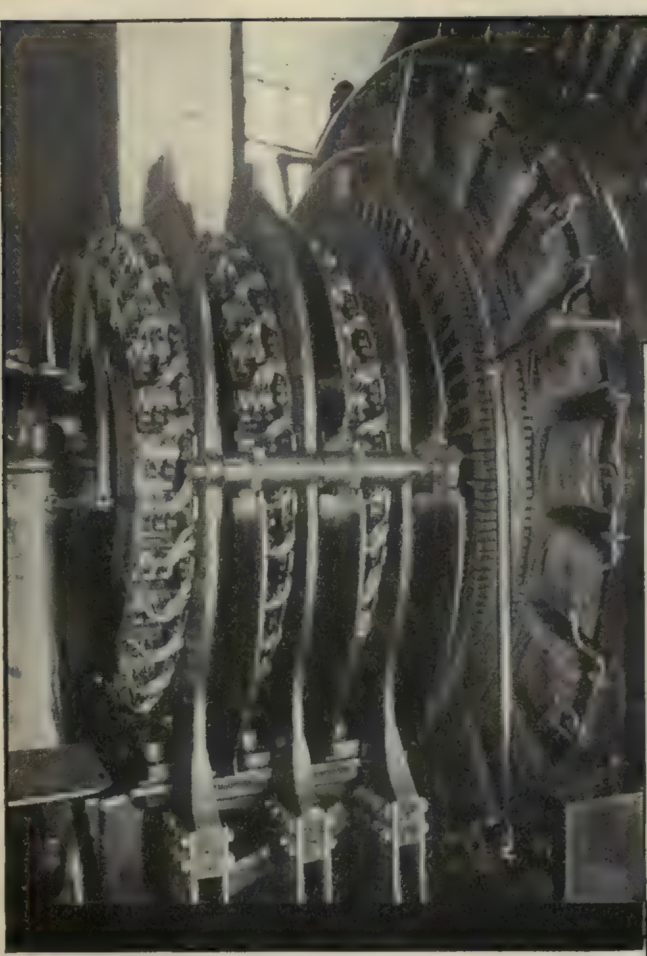
Helps Youngstown Win Coffin Award

Among the principal factors that enabled the Youngstown Municipal Railway to win the Coffin Award this year are: "More riders and more revenue; friendly public; lower costs and increased reliability of service; increased safety for riders, employes and the public . . ." These improvements invariably follow in the wake of Safety Cars—used exclusively by this company and other winners of the Coffin Award.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH



what price economy?



Slip-rings of modern 13,000-ampere, booster-type rotary converter, equipped with National Pyramid metal-graphite brushes

Slip-rings of rotary converter equipped with old-style copper-leaf brushes

The heavy loads of fall and winter are but a few weeks away. This is the time to check-up brush equipment and make sure that it is in condition to carry through the winter without interruption of service. This precaution is especially important in regard to slip-rings of large rotary converters where metal-graphite-composition brushes have superseded the old copper-leaf. Brush-springs should be set up to correct tension and accurately equalized on all the holders. Shunt connections should be clean and firmly secured. Worn brushes should be replaced.

"JUST one of the inevitable snags of the business." That was the attitude toward the heavy expenses involved in turning, grinding, and replacing slip-rings and commutators in the days of copper-leaf, metal-gauze and early abrasive carbon brushes. Ridging and wear caused by these brushes demanded resurfacing at frequent intervals. Maintenance costs were *high.*

In stepped National Carbon Company, Inc., offering its vast research-facilities for the purpose of developing better and more economical brushes. Experiments, trials, more experiments — *success.* Soon National Pyramid Brushes had established new standards, higher speeds had been met, heavier loads and more compact design had become possible. The new brushes kept machinery humming for months and months *without* interruptions.

Major faults corrected, minor faults assumed new importance. Systematic inspection and timely adjustments are a small price to pay for the economical performance of modern brushes. National Pyramid Brushes insure satisfactory service and low maintenance cost in return for this care.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division SILVER STRAND CABLE TRADE MARK REGISTERED Cleveland, Ohio

Branch Offices and Factories:
New York Pittsburgh Chicago Birmingham San Francisco

The Business Paper . . .
and
the Open Mind

"SHOW me a business that has ceased to think" says John Moody, famous economist and investment advisor, "and I'll show you a firm that is on the down grade. Show me a concern where ideas are no longer welcome and I'll show you one that is getting ready to die of dry rot. Show me a company that has cut itself off from the stimulation of other men's thought and other men's knowledge and I will show you a firm whose days are numbered."

And on the other hand, wherever you find a healthy, progressive corporation you will find the open mind. You will sense an alertness to know and use the experience of others. Almost inevitably you will discover that executives regularly and systematically read the business papers of their own and related fields. Indeed, it is a fact, striking in the frequency of its recurrence, that outstanding firms make a policy of requiring executives to follow business papers for new ideas, new facts, new developments. From such a policy springs the perennial resourcefulness that brings success.

The business press of today does more than any other single factor to keep business on its toes. Leading thought, improving methods, continually adding to the available store of exact working information, the business press performs a very real service to the Nation.

To that service the business paper of today owes its influence with business men. To that influence it owes its position as a strong, independent organization; commanding a sound, paid circulation; courting no favors; truckling to no influence; earning its advertising revenue because it is the kind of publication in which advertising is both read and believed.

John Moody is among the best known of economists and financial advisors. As a writer on business subjects he is scarcely less well known than as President of Moody's Investors' Service, investment counsel to many great financial interests. A keen analyst of businesses as investments, few men have better opportunity to evaluate progressive management as a factor in success, or to observe the outstanding part played by technical, industrial and merchandising papers in the development of modern business.

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straight-forward business methods, and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.*

This publication is a member of the Associated Business Papers, Inc. . . . a cooperative, non-profit organization of leading publications in the industrial, professional and merchandising fields, mutually pledged to uphold the highest editorial, journalistic and advertising standards.

THE ASSOCIATED BUSINESS PAPERS, INC.
TWO-NINETY-FIVE MADISON AVENUE · NEW YORK CITY

Bethlehem Silico-Manganese Weldable Crossing and turnout at 10th and Arch Sts., Philadelphia, Pa.

For heavy-traffic locations use *silico-manganese* trackwork

THE new Bethlehem Silico-Manganese Weldable Trackwork has high resistance to impact and abrasive wear. The extremely fine-grain and dense structure of silico-manganese steel becomes more firmly set under constant impact. These qualities combined with weldability make Bethlehem Silico-Manganese the logical trackwork to install at all heavy-traffic locations.

Bethlehem Silico-Manganese Trackwork is readily weldable by any of the standard methods, such as electric-arc, oxy-actylene or Thermit welding.

The wear-resisting properties of Silico-Manganese steel are well established. For years it has been the standard for high-grade tools such as punches, chisels, shear blades, etc., as well as for finest quality automobile springs, and for parts subject to shock and extremely hard grinding wear with little or no lubrication.

Bethlehem Silico-Manganese Weldable Trackwork can be installed at all heavy-duty locations with confidence that it will stand up under the most severe conditions of service.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.
District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis
Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.
Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

BETHLEHEM
Silico-Manganese
Trackwork—Design 999

ANOTHER GREAT TRANSPORTATION COMPANY FINDS ECONOMY IN BALANCED PERFORMANCE

The motor coaches of a midwestern transportation company travel nine million miles a year. Operating on such a large scale, the company naturally watches costs closely, and their motor coaches are run as economically as any in the country.

One of the cost-reducing methods adopted by this company was to standardize on Red Crown Gasoline and Polarine Motor Oil. A check-up of costs has shown real economy in the balanced performance these products give.

Red Crown Gasoline and Polarine Motor Oil have been refined especially to give balanced performance, to work with that harmony essential to efficient service and low cost operation. Red Crown burns clean . . . gives power and mileage. Polarine is rich and sturdy . . . supplies thorough, effective lubrication to the motor.

Try this combination in one of your motor coaches. You will find the combined operating cost of Red Crown and Polarine lower than that of any other fuel and motor oil.

STANDARD OIL COMPANY (*Indiana*)
General Offices: 910 South Michigan Ave., Chicago, Ill.
208-A

RED CROWN ETHYL GASOLINE
New— POLARINE MOTOR OIL

Among the Maples

in London-*Ontario*

where-

London Street Railway properties were faced with the identical problems facing street railway operators in scores of other American and Canadian cities.

how-

the progressive management of the London Street Railway is solving them with—

Yellow Coaches

For the Plaintiffs: the City of London

Exhibit A:

131 years of steady growth in a city of 70,000 with thirty square miles of area, 464 manufacturing plants and congested traffic.

Exhibit B:

Urgent need for a flexible comprehensive transportation system for the municipality.

Exhibit C:

Transportation for the newer outlying residential and educational districts.

YELLOW

For the Defendants:
the London Street Railways

Exhibit A:

Steadily *Decreasing* Street Car Patronage		Steadily *Increasing* Bus Patronage
11,559,690	1926	954,932
11,224,135	1927	1,389,382
10,858,810	1928	1,525,076
9,634,225	1929	2,217,291
	1930 (1st 3 mo.)	759,798

Exhibit B:

Inability to meet constantly increasing burdens of paving, repair and/or replacement of obsolete rolling stock.

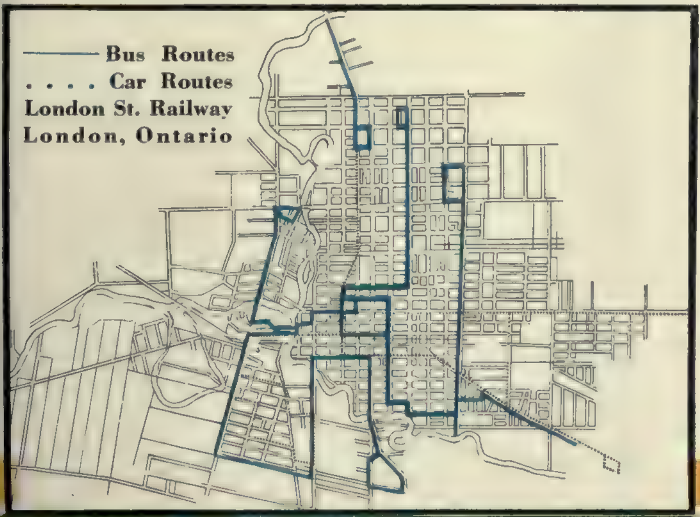
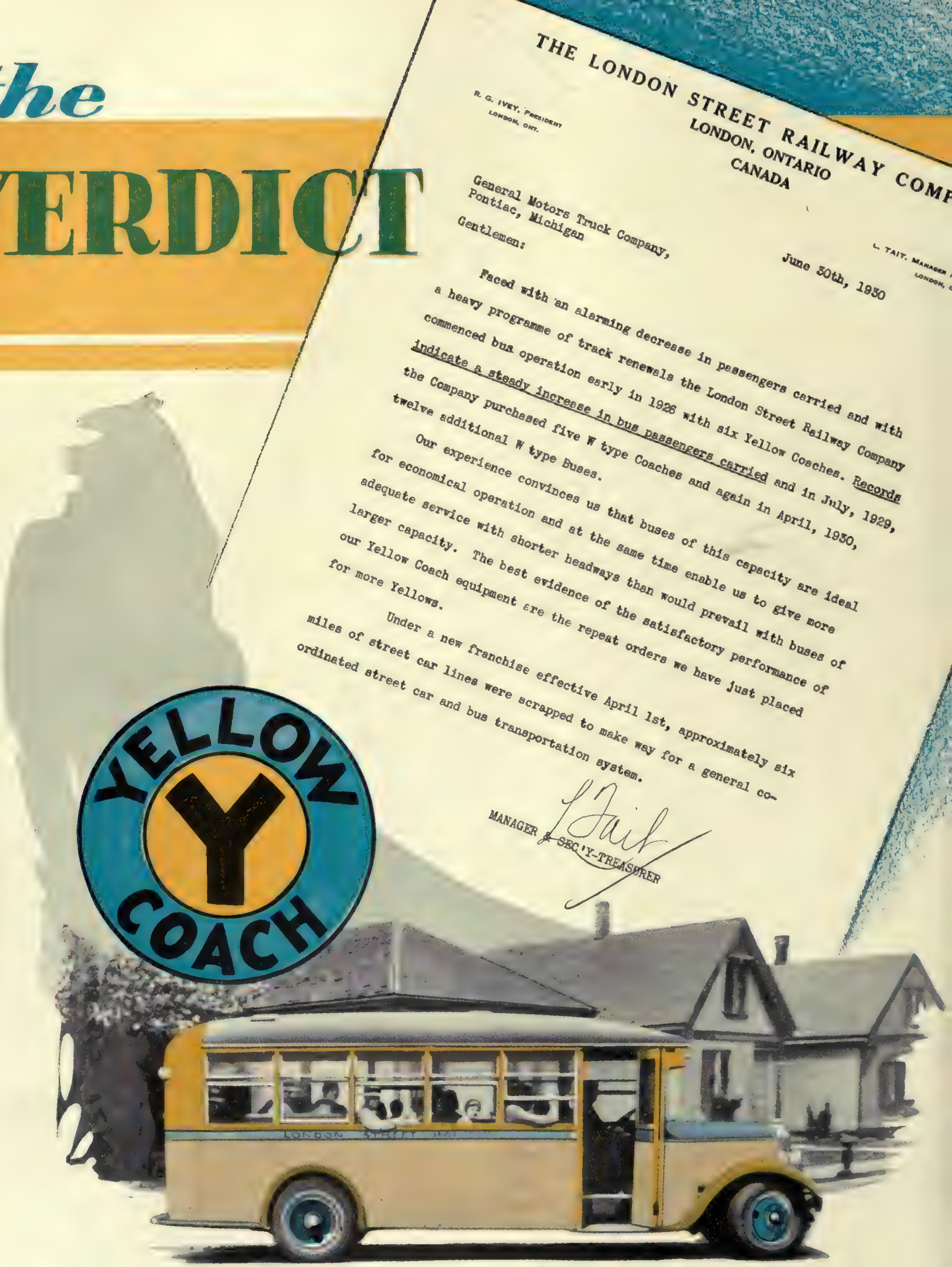


Exhibit C:

Financial impossibility of extending street car track and overhead to new residential and institutional districts.

the VERDICT



THE LONDON STREET RAILWAY COMP
LONDON, ONTARIO
CANADA

R. G. IVEY, PRESIDENT
LONDON, ONT.

L. TAIT, MANAGER

General Motors Truck Company,
Pontiac, Michigan

June 30th, 1930

Gentlemen:

Faced with an alarming decrease in passengers carried and with a heavy programme of track renewals the London Street Railway Company commenced bus operation early in 1926 with six Yellow Coaches. Records indicate a steady increase in bus passengers carried and in July, 1929, the Company purchased five W type Coaches and again in April, 1930, twelve additional W type Buses.

Our experience convinces us that buses of this capacity are ideal for economical operation and at the same time enable us to give more adequate service with shorter headways than would prevail with buses of larger capacity. The best evidence of the satisfactory performance of our Yellow Coach equipment are the repeat orders we have just placed for more Yellows.

Under a new franchise effective April 1st, approximately six miles of street car lines were scrapped to make way for a general co-ordinated street car and bus transportation system.

L Tait

MANAGER & SEC'Y-TREASURER

Type W. Yellow Coach

GENERAL MOTORS TRUCK CO.
Subsidiary of Yellow Truck & Coach Mfg. Co.
PONTIAC, MICH.

MORE THAN A MILLION MILES with Socony Special *plus* Ethyl

NO ROAD is too rough, no grade too steep for Socony Special *plus* Ethyl—the only *premium* gasoline sold in New York and New England to which Ethyl fluid has been added. It does not knock, it starts and picks up instantaneously, it has all the power—and more—that the heaviest bus can possibly need. And it is the cheapest fuel that fleet owners can use because it cuts down shifting to a minimum and gives more miles to the gallon.

Holden's Tours and Taxi Service of Melrose, Mass., and the Beaver Tours of Boston have used Socony Special *plus* Ethyl for far more than a million miles: up into the lumber woods over practically unbroken trails, everywhere throughout the length and breadth of New York and New England.

Try Socony Special in your fleet, and check the mileage and mechanical cost. You'll find that the few extra cents per gallon that it costs are more than balanced by the additional mileage.

SOCONY

GASOLINE · SPECIAL GASOLINE *plus* ETHYL

MOTOR OIL · AIRCRAFT OIL

STANDARD OIL COMPANY OF NEW YORK

AIR BRAKES

have rightly become a part of America's finest transport vehicles

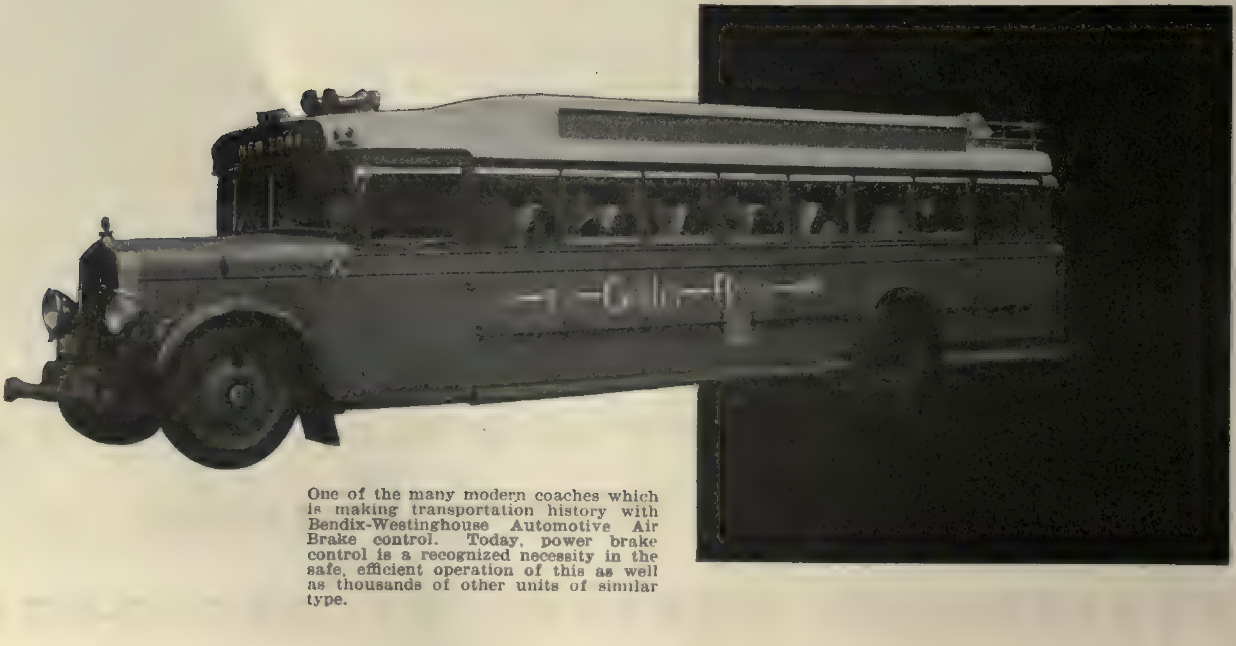
Because of their smooth, quick, powerful action, their ability to meet any emergency squarely — Bendix-Westinghouse Automotive Air Brakes have taken their place as indispensable equipment in the safe, economic operation of the modern motor coach.

Nationwide, the foremost manufacturers of heavy duty transport equipment have recognized the necessity for a positive stopping force as a perfect balance for present day speed and power. These builders have adopted Bendix-Westinghouse Brakes as standard factory equipment, while many others are equipped to install the system upon specification.

●

For those coach operators who are interested in the more technical advantages of the Bendix-Westinghouse Brake, a competent staff of carefully trained brake engineers is available for consultation. This service is maintained in the interest of better brake control for the motor transport operator and its acceptance incurs no obligation.

BENDIX-WESTINGHOUSE
AUTOMOTIVE AIR BRAKE CO.
Pittsburgh - - - Pennsylvania



One of the many modern coaches which is making transportation history with Bendix-Westinghouse Automotive Air Brake control. Today, power brake control is a recognized necessity in the safe, efficient operation of this as well as thousands of other units of similar type.

GARY

WROUGHT STEEL WHEELS

The name ILLINOIS on wrought steel wheels assures the railroads safety, dependability and long life. These three factors all contribute to the success of the Gary Wrought Steel Wheel.

Our Wheel Engineers are at Your Service.

Illinois Steel Company
Subsidiary of United States Steel Corporation
General Offices
208 South La Salle Street, Chicago

Check your insulating need

INSULATING varnishes in great variety . . . filling compounds . . . insulating papers . . . tapes! You will find them described in detail in this new bulletin.

Recommended uses for these performance-proved insulations, their characteristics and full shipping information is given. Manufacturers as well as electrical repair and maintenance men are finding this bulletin invaluable. If you have not received a copy write for one.

MICA INSULATOR COMPANY

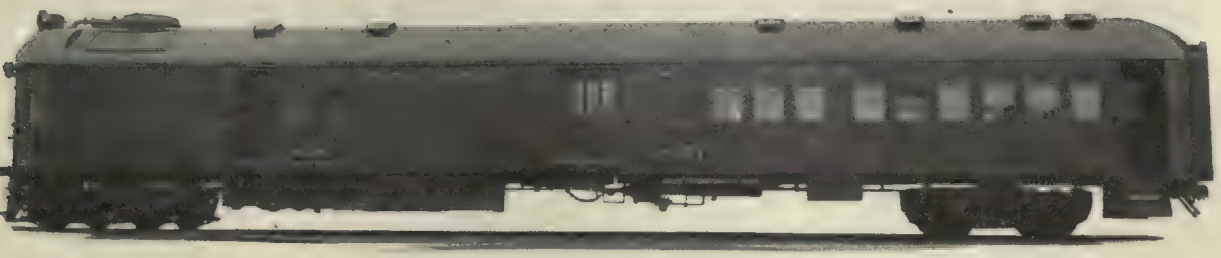
New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco
Los Angeles Toronto Montreal *Works*: Schenectady, N. Y. London, Eng.

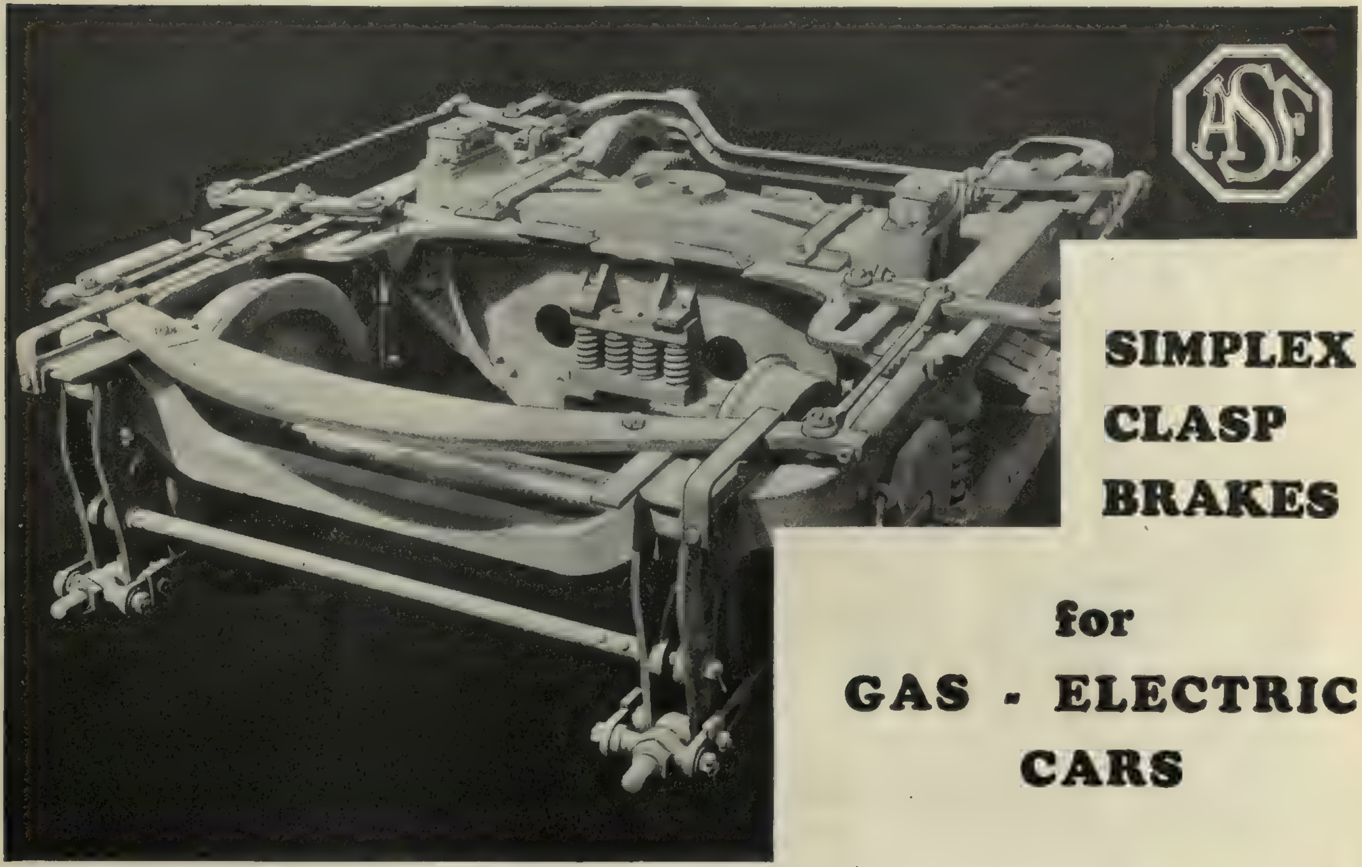
PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION





SIMPLEX
CLASP
BRAKES

for
GAS - ELECTRIC
CARS

RAILROADS of the country are using American Steel Foundries Clasp Brakes for passenger equipment.

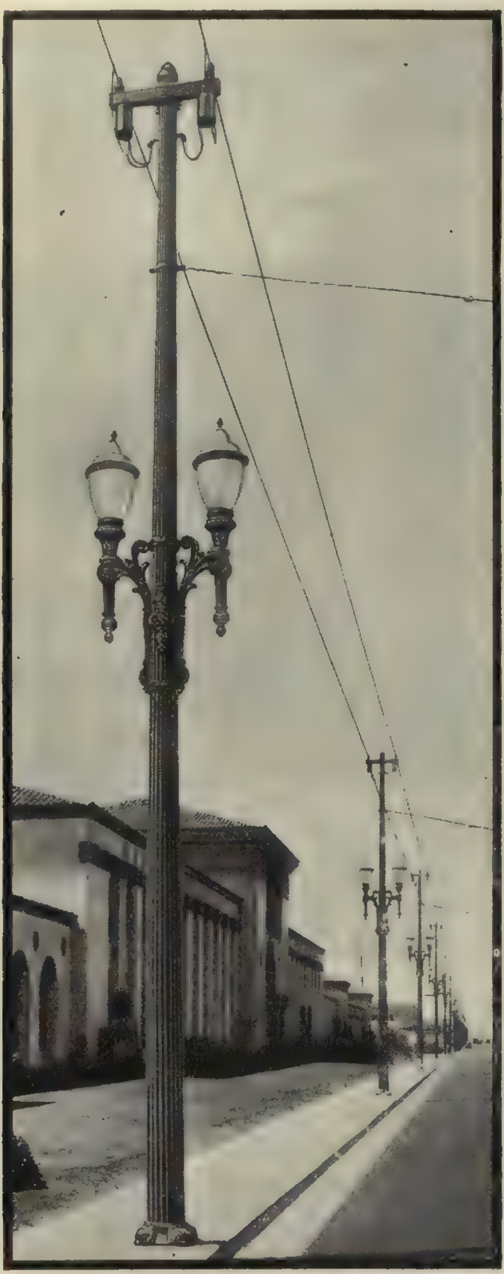
Greater retardation; reduction in brake shoe wear; desirable balancing of braking forces—all have proved the value of Clasp Brakes.

Gas-electric cars have increased in weight and size until they now are frequently larger than standard passenger cars. For these reasons, they, too, need Simplex Clasp Brakes. Clasp Brakes are applicable to Gas-Electric Car Trucks and should be included in your specifications.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Now Berkeley Chooses Fluted Steel POLES



Berkeley, California, is noted for its beautiful thoroughfares

REPLACING other poles and individual lighting standards, Union Metal Heavy Duty Poles have transformed the appearance of San Pablo Avenue in Berkeley, California.

These 32-foot poles perform their numerous duties safely and with a minimum of attention. Slender, straight and uniform, they represent the ideal method of carrying electrical services through city streets.

In Berkeley the Union Metal Poles are equipped with twin street lighting units, cross arms, trolley span-wire supports and concealed cable-risers. In numerous other cities they are also used for a multitude of duties—often at a great saving in cost and always to the betterment of street appearance.

If you are not familiar with this advanced type of pole write for complete information.

THE UNION METAL MANUFACTURING COMPANY
GENERAL OFFICES AND FACTORY • CANTON, OHIO
SALES OFFICES: New York, Chicago, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
General Electric Merchandise Distributors Graybar Electric Company, Inc.
Offices in all principal cities

Distributed by GraybaR

UNION METAL DISTRIBUTION POLES

MERCHANDISE DISTRIBUTOR

LONG PRODUCTS

Automotive
Clutches
and
Radiators

LONG

LONG MANUFACTURING COMPANY
DETROIT, MICHIGAN

Quality Crossings

A SINGLE uniform standard of quality in the three factors so important in any crossing installation—surface, alignment and splice bar fit—is always available in Lorain design, materials and workmanship.

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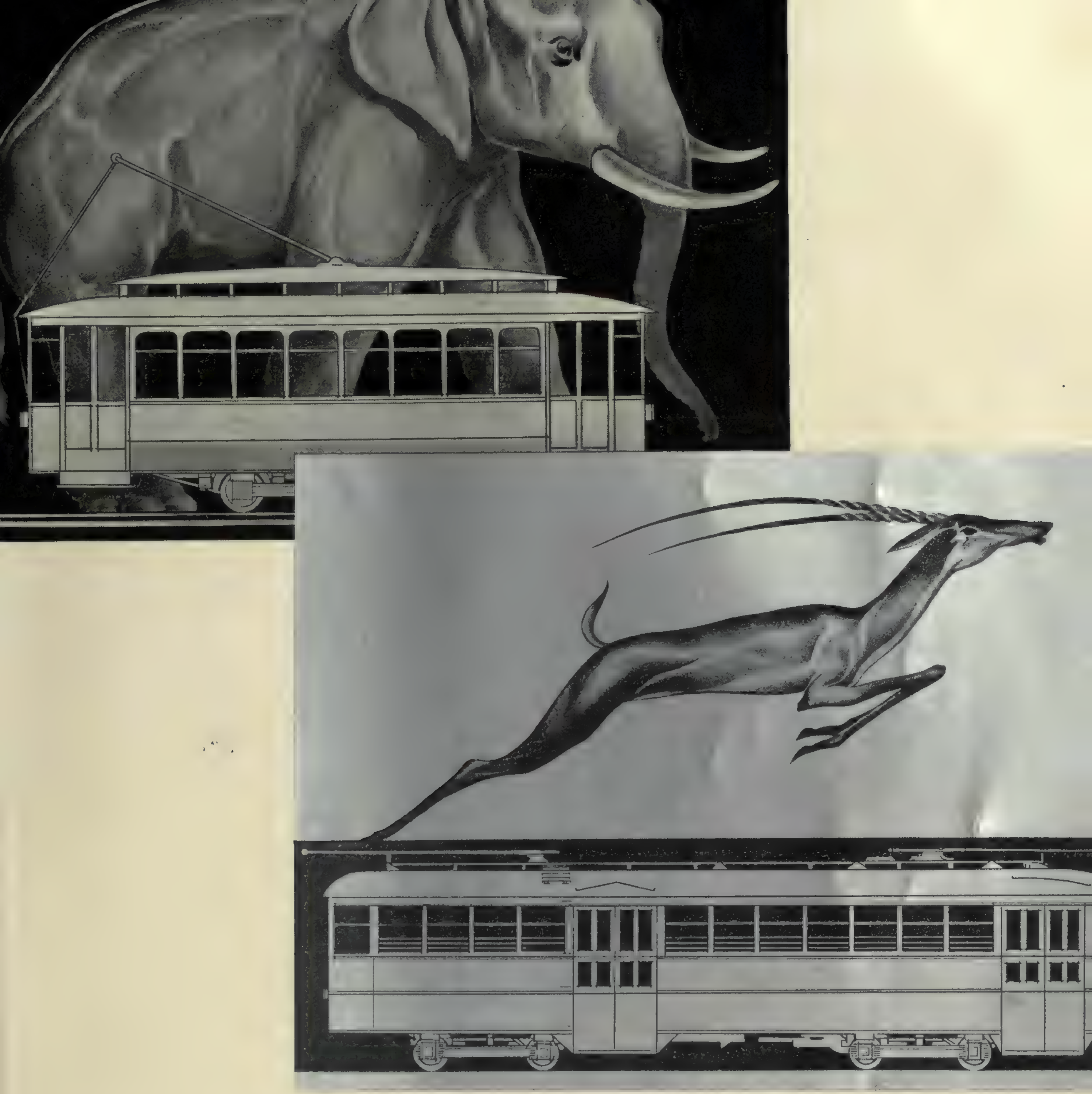

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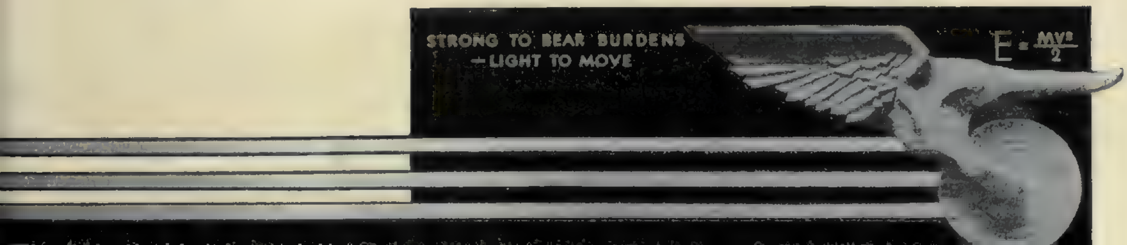

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Suppose you let 15 or 20 passengers ride free on every trip on every car, day in and day out, This combined weight would about equal the 2,500 lbs. removed from this street car built for the Louisville Railway Company by Cincinnati Car Company. 2,300 lbs. of Alcoa Aluminum saved 2,500 lbs. of dead-weight.

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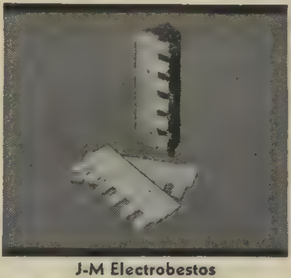

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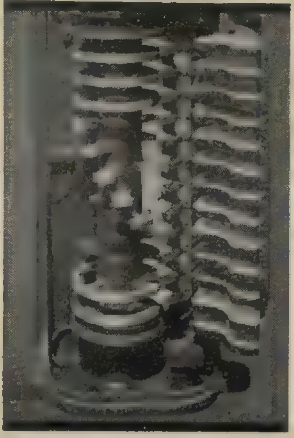

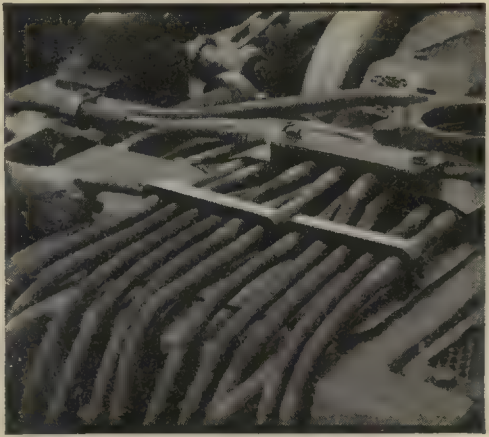

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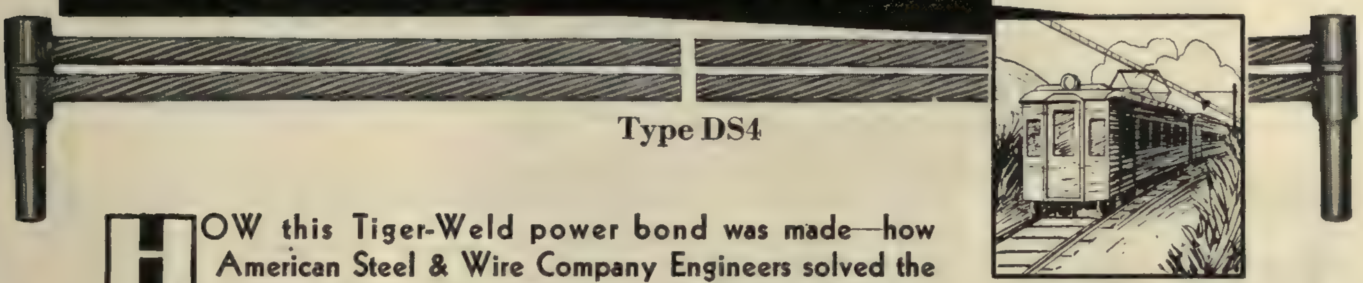

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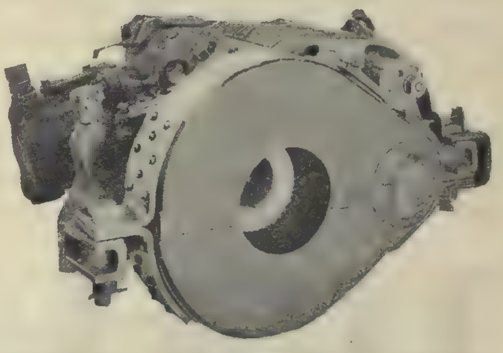

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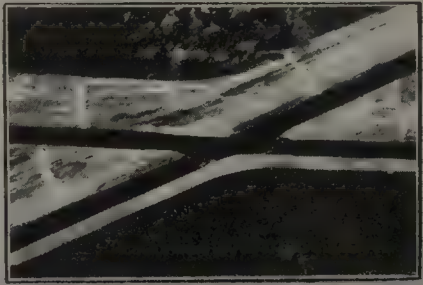

Patent No. 1,732,202

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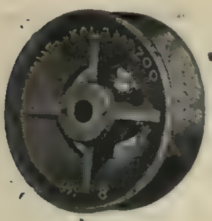

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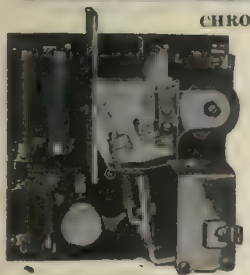

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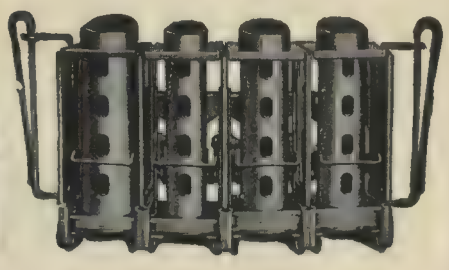

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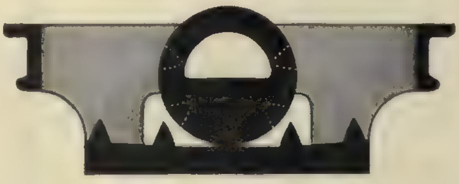

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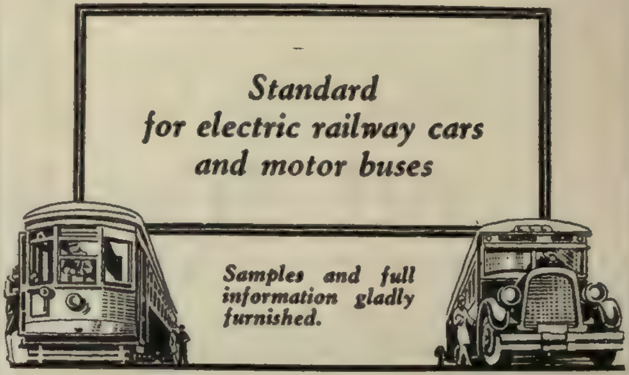

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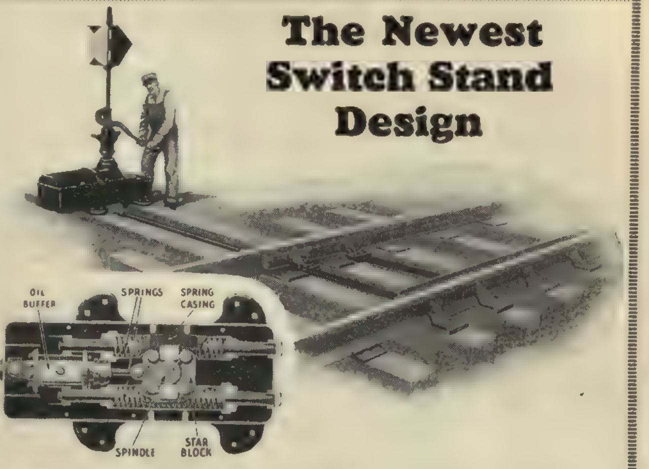

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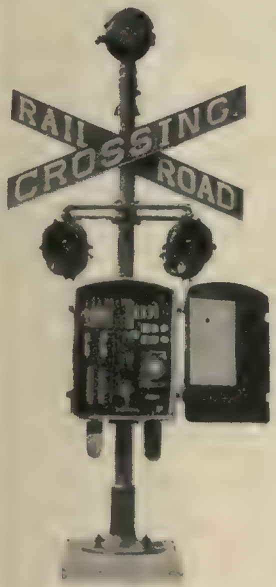

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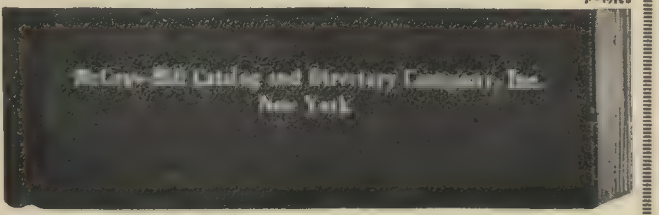

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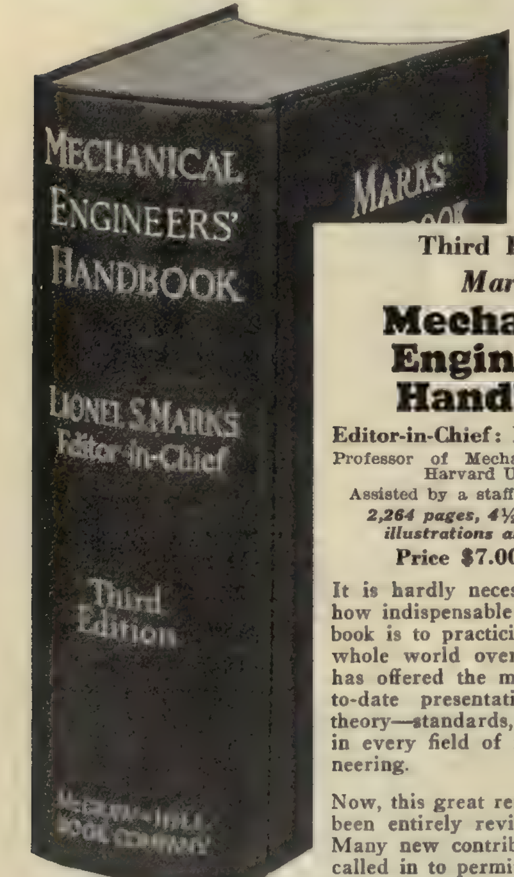
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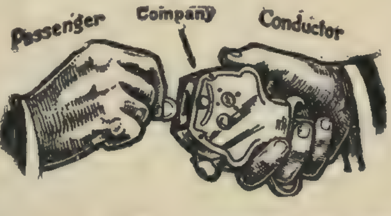

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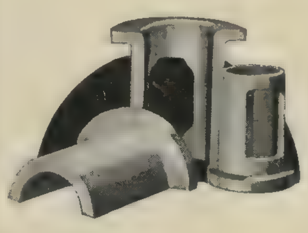

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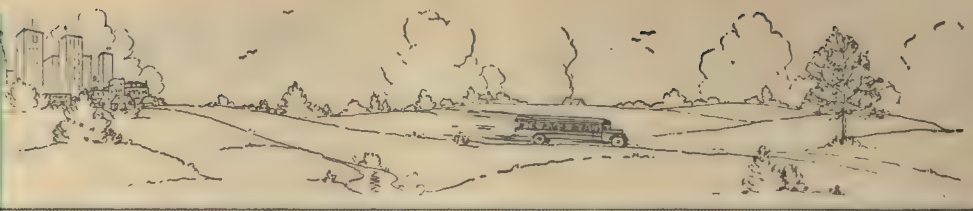

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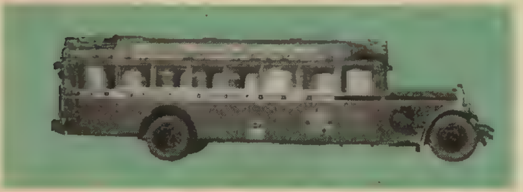

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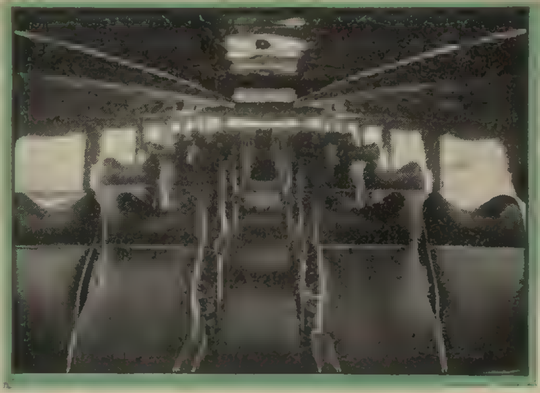

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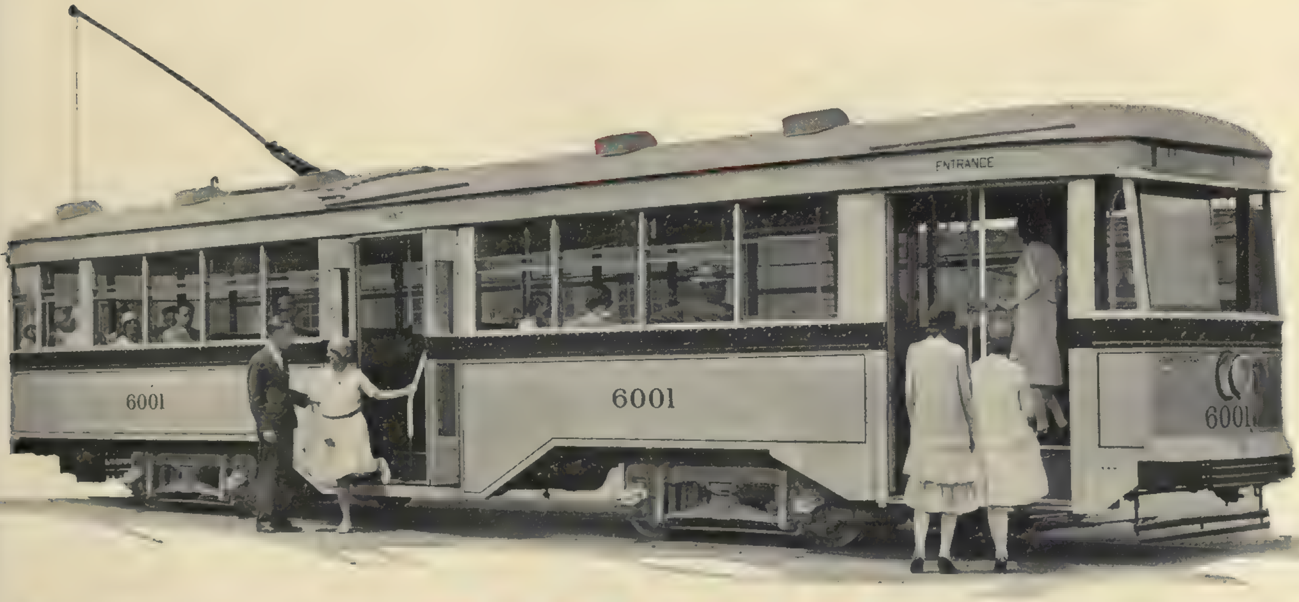

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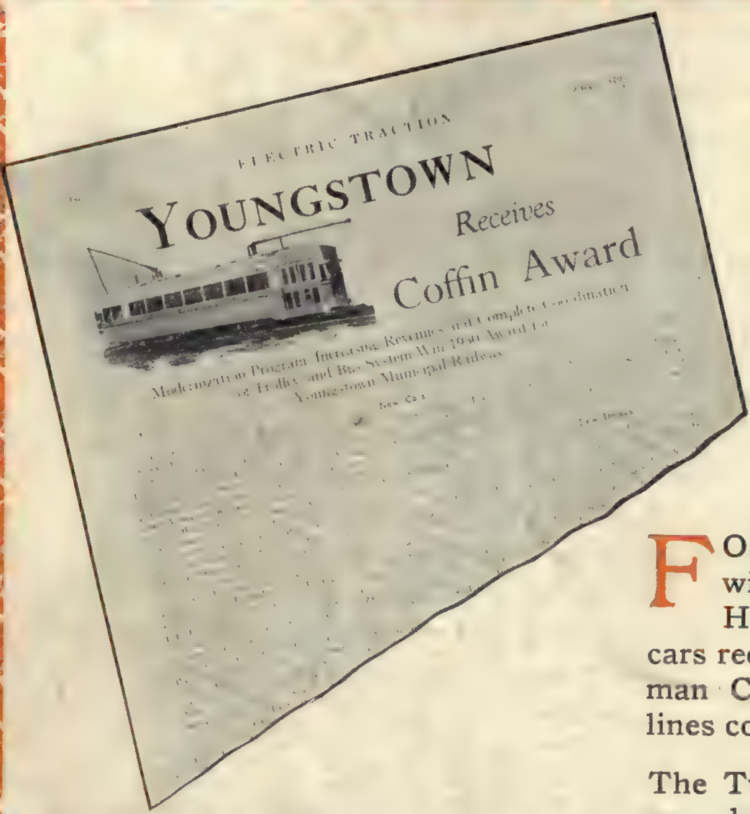

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